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A revision of the *Halysidota tessellaris* species-group (*Halysidota* sensu stricto) (Lepidoptera: Arctiidae)

A. Watson

Entomology series Vol 40 No 1 28 February 1980

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A revision of the *Halysidota tessellaris* species-group (*Halysidota* sensu stricto) (Lepidoptera: Arctiidae)

A. Watson K

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Synopsis

The 28 species considered to be monophyletic and congeneric with *Halysidota tessellaris* Smith (the type-species of *Halysidota* Hübner, a genus of the New World tribe Phaegopterini) are characterized, keyed and discussed. Seven new species and one new subspecies are described, fourteen names are removed from synonymy, nine subspecific names are elevated to species rank, one subspecific name is reinstated as a valid specific name, five names are newly placed in synonymy and one species is transferred from *Opharus* Walker to *Halysidota*. The phylogeny and defence strategies of *Halysidota* sensu stricto (the *tessellaris*-group) are discussed.

Introduction

The reasons for undertaking the present study were twofold. First, in connection with a projected volume of the *Moths of North America north of Mexico* (Dominick *et al.*, Eds), it was necessary to identify those species of *Halysidota* Hübner that are similar in appearance to *H. tessellaris*. Second, there was a need to provide valid names for species of moths used by the author in food-acceptance trials with insectivorous birds in northern Venezuela.

Two species of *Halysidota* sensu stricto (*tessellaris* and *harrisii*) are minor pests of forest and shade trees in North America. The abundance of *schausi* and *fuliginosa* in parts of Central America suggests that these too are potential pest species.

Status of *Halysidota* Hübner

About 200 species are currently placed in the genus *Halysidota* (sensu Seitz, 1922, and subsequent authors) but I consider only 28 of these to be congeneric with *tessellaris*, the type-

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species. I have examined the type-specimens of most of the remaining species, including the genitalia of a representative sample (see Watson, 1971, in which the types of 96 nominal species of *Halysidota* are figured) but it is clear that much revisionary work needs to be undertaken before these can be placed with confidence in other genera or in new genera established to accommodate them. Some should probably be placed in *Lophocampa* Harris, *Thalesa* Schaus, *Leucanopsis* Rego Barros, *Sontia* Walker, *Amastus* Walker or *Hemihyalea* Hampson. The type-species of *Euhalisidota* Grote, *Munona* Schaus and *Euschausia* Dyar, which are also currently placed in *Halysidota*, should be removed. These changes are outside the scope of the present paper, however, especially as some of the problems are now being investigated in the United States by Professor J. G. Franclemont.

In the present paper I redefine the genus *Halysidota* and discuss the 29 species now considered to comprise this apparently monophyletic group. [The use in the text of the synonymous terms '*tessellaris*-group' and '*Halysidota* sensu stricto' is dictated by syntactic convenience.]

Previous confusion concerning the identity of *tessellaris*-group species has resulted from the close resemblance in both external and genitalic characters between species. In Mexico, for example, adult *donahuei* are probably indistinguishable externally from adult *instabilis*, and it is probably not possible to separate specimens of the North American *tessellaris* and *harrisii* on external characters. There are apparently no male genitalic differences between the supposed sister-species *schausi* and *davisii*, between *tessellaris*/*harrisii* and *meridionalis* and between *underwoodi* and *pectenella*. Seitz (1922) illustrated in colour 22 nominal species of *Halysidota* sensu stricto. Thirteen of these illustrations are misleading as a guide to the species involved and are possibly based on misidentifications (that of '*cinctipes*', for example). The figures which do depict the relevant species fairly well are those of *meridionalis*, *underwoodi* (the figures of '*bricenoi*' and '*meridensis*', but not '*underwoodi*'), *atra* (both sexes), *tucumanicola* ('*tucumana*'), *intensa* ('*subterminalis*') and *masoni*. More recent confusion has resulted from a paper by Travassos (1963) in which 22 species and subspecies names were placed in the synonymy of *tessellaris*; only two of these names are in fact junior synonyms.

Material, acknowledgements and abbreviations

Specimens were lent to me by the following institutions: Academy of Natural Sciences (ANS), Philadelphia; Allyn Museum of Entomology (AM), Sarasota; American Museum of Natural History (AMNH), New York; Carnegie Museum (CM), Pittsburgh; Los Angeles County Museum of Natural History (LACM), Los Angeles; Muséum national d'Histoire naturelle (MNHN), Paris; Museum für Naturkunde der Humboldt Universität (MNHU), Berlin; National Museum of Natural History (USNM), Washington, D.C.; Texas A & M University (TAM), College Station; Universidad Central de Venezuela (UCV), Maracay; Universidade Federal do Paraná (UFP), Curitiba; University Museum (UM), Oxford; Zoologische Sammlung des Bayerischen Staates (ZSBS), Munich.

Valuable material was also provided by Mrs Avril Fox, London; Dr Claude Lemaire, Paris; Mr H. R. Pearson, Rio de Janeiro; and by Count H. de Toulgoët, Paris. Other material used during this study forms part of the British Museum (Natural History) (BMNH) collections and includes specimens I collected in Costa Rica, Venezuela and the United States.

Collectors' names have in general been omitted from the lists of examined material but have been included in primary type-data. This has been done in the interests of economy and is not an indication that I underrate the valiant effort of the collectors, some of whom operated before the advent of mechanized transport.

I am grateful to the following colleagues and friends who arranged loans of material: V. O. Becker, the late H. K. Clench, W. Dierl, J. P. Donahue, D. C. Ferguson, F. Fernandez Yepez, J. W. Ismay, C. Lemaire, O. Mielke, J. Y. Miller, L. D. Miller, D. Otte, H. R. Pearson, R. Peigler, F. H. Rindge, E. L. Todd, H. de Toulgoët and P. Viette. Special thanks are due to Julian Donahue, Francisco Fernandez Yepez and Lloyd Martin, without whose help my visits to Central and South America and to south-western U.S.A. would have been impossible. Don Davis, Wolfgang Dierl, Doug Ferguson, Jackie and Lee Miller and Ed Todd are thanked for their kindness during visits to collections under their care.

Dr L. A. Mound, Dr Miriam Rothschild, Dr K. S. O. Sattler, Mr R. I. Vane-Wright and the referees read parts of the manuscript and suggested several improvements. Mrs Avril Fox generously allowed me to extract data from her notes on the life-histories of some Venezuelan Lepidoptera. Dr Charles T. Collins encouraged my studies of prey acceptance by birds at Rancho Grande (some results of which are described in the paragraphs on defence) and provided an invaluable service in identifying the birds.

The technical assistance of David Goodger is gratefully acknowledged and that of Tim Willett-Whittaker in the early stages of this study. Tina Adams typed the final draft of the manuscript.

The terms 'sp. rev.' and 'nom. rev.' indicate that a species or subspecies name respectively has been removed from synonymy, 'stat. n.' a species-group name that has changed its status, e.g. from subspecific to specific rank, and 'stat. rev.' a previously rejected status of a species-group name that is now accepted. Abbreviations of depositories of studied material have been given on p. 2.

Illustrations

The individual parts of the male genitalia are to the same scale for each species unless bar-scales indicate otherwise. Microscope slide preparations from which the illustrations of genitalia have been produced are indicated in the legends as, for example, 'slide 2256' if this is a BMNH preparation. If the slide is the property of another institution, the slide number, if any, is preceded by an appropriate annotation, e.g. 'USNM slide AW317'. All the photographs were taken by the Photographic Unit of the BMNH.

Phylogeny

The 29 species of the *tessellaris*-group closely resemble one another in overall features of the male genitalia and are judged to be monophyletic on the basis of two synapomorphic genitalic characters: 1, the presence of a digitate lobe on each side of the vinculum; 2, the presence of a flattened process (contorted in some species) at or near the middle of the costal margin of the valve. The sister-group or sister-species of *Halysidota* has not been identified as such but will possibly be found amongst other long-winged Phaegopterini currently placed in *Halysidota* sensu lato, *Amastus* Walker or related taxa.

Within *Halysidota* sensu stricto there are three subgroups. Subgroup A is a fairly homogeneous, apparently monophyletic assemblage of 27 species sharing two apomorphies: 1, the presence of a distinctive marking at the base of the forewing formed by the partial confluence of the sub-basal and antemedial fascia and 2, the presence of a well-marked reniform (or discocellular patch) (Fig. 2). *H. masoni* stands apart from the rest of its subgroup by virtue of two autapomorphies: 1, the bright orange ground-colour of the forewings and 2, the greyish white colour of the fasciae. The remaining 26 species are synapomorphic in respect of the blue-green or greyish green colour of the mid-dorsal line on the thorax and the margins of the patagia and tegulae, but their interrelationships are in general uncertain.

The proposed linking of *tessellaris* and *harrisii* as sister-species is based on synapomorphy of the uniform coloration of the clypeofrons and palp which lack brown scales in these two externally indistinguishable species. The larvae of *tessellaris* and *harrisii* are easily distinguished from each other and have different food plant preferences; *tessellaris* is a general feeder on broad-leaved trees (on occasion including *Platanus*), whereas *harrisii* feeds exclusively on *Platanus*, a difference which may have had some bearing on the evolution of *tessellaris* and *harrisii* from a supposed common ancestor. *H. meridionalis*, a Mexican species, is a possible sister-species of the pair *tessellaris* and *harrisii*. It too lacks brown scales on the clypeofrons, unlike most specimens of all other species of the *tessellaris*-group. Its genitalia are identical to those of *tessellaris*, but most specimens are distinguishable on colour-pattern from *tessellaris* and *harrisii*. The two alternatives to this explanation of the relationships involve accepting *meridionalis* and *harrisii* as the sister-group of *tessellaris*, or *meridionalis* and *tessellaris* as the sister-group of *harrisii*, but an assessment based on overall similarity of adult characters indicates that the first interpretation is more likely to prove correct. The relationship of the

Antillean *insularis* to the trio *tessellaris, harrisii* and *meridionalis* is also possibly monophyletic; the male genitalia are indistinguishable from those of *tessellaris* except for the size of the spines in the vesica, but there are no identifiable synapomorphies to support this grouping.

H. instabilis and *donahuei* are probably sister-species on the basis of the shape of the uncus which is strongly flanged laterally (Figs 80, 82), a feature judged to be apomorphic. *H. cinctipes* and its presumed vicariant *ata* are synapomorphic in respect of the large mid-costal lobe of the valve, a character state shared with *nigrilinea* and *yapacaniae*, neither of which, however, are considered to be close to *cinctipes* or *ata*. On the basis of overall dissimilarity in colour-pattern, it seems likely that the large mid-costal lobe of *nigrilinea* and *yapacaniae* evolved independently in each of these species and in the sister-species pair *cinctipes* and *ata*.

H. schausi and *davisii* differ in several characteristics of the colour-pattern but have identical male genitalia. Their association as sister-species is supported by allopatry, and by synapomorphy of the tegumen lobes which are greatly enlarged and heavily spinose.

Other species of subgroup A having character states judged to be apomorphic are as follows.

atra. Sexually dimorphic in coloration (males dark brown, females yellow-brown).
cinctipes. Thorax partly blue-green ventral to eyes and forewing.
conflua. Fasciae confluent over much of forewing.
fumosa. Longest female antennal pectination more than twice width of antennal shaft at that point. Uncus short (Fig. 94).
intensa. Forewing markings heavily outlined with black in costal area (Figs 43, 44).
orientalis. Tegumen lobes scobinate; with oblique dorsal carina.
ruscheweyhi. Fasciae much reduced in emphasis (Fig. 11).

An assessment of phylogenetic relationships between the species of subgroup A (excluding *masoni*) based on overall similarity has in general proved to be unproductive. Both external and genitalic characteristics are fairly homogeneous throughout the group and the intraspecific variation in colour-pattern of, for example, *cinctipes* and *davisii* is as great as the interspecific differences between each of them and its sister-species *ata* and *schausi* respectively.

Subgroup B is represented by one species, *elota*. It possesses two autapomorphic features: 1, the confluence of the sub-basal and antemedial fasciae towards the costal margin of the forewing and 2, the confluence of the medial and postmedial fascia towards the anal margin of the forewing.

Subgroup C, represented by *leda*, is difficult to assess phylogenetically because of the poorly marked fasciae at the base of the forewing, but the uniformity of the discernible fasciae suggest that this is the most plesiomorphic of the *tessellaris*-group.

In the absence of subgroup C it would have been reasonable to accept subgroup B as the sister-group of A. This may still prove to be so, but the failure to find definitive characters in subgroup C leaves some doubt about the relationships of these three subgroups.

Defence

Unpalatability

During a collecting visit to Rancho Grande near Maracay, northern Venezuela, in July and August 1976, I studied the prey preferences of 18 species of birds feeding from and around a collecting sheet. The sheet was illuminated throughout the night and was covered with several hundred resting moths of many families each morning. The moths attracted the insectivorous birds, which assembled soon after dawn. Records were made of acceptances and rejections of moths tossed towards the feeding birds and of predation by the birds of moths resting on the sheet. During a total of 40 hours of observation no predation of *tessellaris*-group specimens was noted other than by flycatchers, of which the commonest were *Myiodynastes chrysocephalus* (Golden-crowned Flycatcher), *Myiarchus tuberculifer* (Dusky-capped Flycatcher) and *Contopus fumigatus* (Greater Pewee) (several records), and by a single *Philydor rufus* (Buff-fronted Foliage Gleaner) (two records, one inconclusive). Although the flycatchers accepted *underwoodi*, they did so with more care than they gave to invariably acceptable geometrids (e.g. *Pero* Herrich-

Schäffer) and noctuids (e.g. *Gonodonta* Hübner) which were taken and swallowed at once by 18 species of birds studied. For example, a Greater Pewee, having captured a specimen of *underwoodi*, shook the moth for several seconds and removed the legs before swallowing it, and both the pewee and a Dusky-capped Flycatcher were seen to shake and juggle with *underwoodi* specimens before swallowing them. Blest (1964), during tests carried out in Panama, also recorded the rejection of *tessellaris*-group specimens, in this instance by caged *Cebus* monkeys which rejected *interlineata*. Dunning (1968) found that her caged bats rejected *tessellaris*. These results suggest that the *tessellaris*-group is at least in part unpalatable to some vertebrate predators.

The foodplants of few *tessellaris*-group larvae are known (Table 2) but the larvae of *schausi* have been recorded in Uruguay feeding on Solanaceae, a group of plants well known for their poisonous alkaloid content (Hawkes *et al.*, 1979) and often favoured by aposematic distasteful Lepidoptera such as ithomiine butterflies and various arctiid moths (Brower & Brower, 1964; Rothschild *et al.*, 1979, in press). A foodplant factor may also be responsible for the apparent unpalatability of *underwoodi* whose larvae have been recorded feeding on a species of Euphorbiaceae (Fox, 1978, unpublished).

Dr Miriam Rothschild (pers. comm.) has suggested that the legs of *tessellaris* may contain irritant or toxic substances, which could be disseminated via the tibial spurs but more probably by the rupture of the tarsal segments. She points out that the claws are often left behind in the net if the insect is captured.

Feeding by adults on plants containing pyrrolizidine alkaloids (PAs) has been recorded by Pliske (1975) for *interlineata* (1 ♂), *schausi* (1 ♀) and *tessellaris* (1 ♀) at sites in Panama, Venezuela (Rancho Grande) and Florida respectively. It has been suggested by Rothschild *et al.* (1973) and Pliske (1975) that the pyrrolizidine alkaloids may have a defensive function in those species of Arctiidae and Ctenuchidae. The few records of visits by *tessellaris*-group adults to PA plants suggests, however, that PAs are not vital to the moths' chemical defences, or that they supplement existing deterrents. It is significant that some of the arctiids listed by Pliske (1975: 467) as never visiting PA plants or PA baits are probably highly unpalatable, e.g. *Viviennea moma* Schaus (Watson, 1975).

Warning coloration

The unusual coloration of *masoni* may be the result of evolution towards the bright coloration of *Anaxita decorata* (Walker) (1855: 748), a species probably sympatric with *masoni* in Orizaba, Mexico. Most species of *Anaxita* Walker have strongly striped red, orange and yellow forewings which suggest an aposematic life-style and that the genus as a whole will prove to be highly distasteful to birds and other diurnal vertebrates and probably less acceptable to these predators than species of *Halysidota* sensu stricto. *H. masoni* may therefore be a Müllerian mimic of *A. decorata*; Müllerian in the sense that *masoni*, although probably unpalatable, is less so than *decorata*. Similar associations have been described recently by Brown (1977) with species of the ithomiine genera *Melinaea* Hübner and *Mechanitis* Fabricius as the Müllerian models or 'prime movers'.

Reflex immobilization

Reflex immobilization (Blest, 1957; 1964) or death feigning as a response to physical manipulation can conceivably be a defence tactic against diurnal avian predators. A moth which drops into the vegetation where it remains motionless and concealed after having been pecked by a foraging bird is likely to escape further attention from its predator and unlikely to excite the interest of birds like flycatchers that commonly attack flying insects. Tests carried out at Rancho Grande with the three species of flycatcher listed earlier involved tossing quiescent death-feigning *underwoodi* towards the birds, alternating each offering with an active noctuid which was invariably captured and eaten. I found that *underwoodi* specimens that remained immobilized elicited no response from the flycatchers, but that those moths which started to fly were in general attacked by the birds. I have noted similar reflex immobilization by *davisii* in

Arizona, and Blest (1964) recorded the same response to handling by *underwoodi, interlineata* and *atra* in Panama.

The acceptance of *tessellaris*-group specimens and of other arctiids (Watson, in preparation) by flycatchers is possibly an adaptation associated with their prey-capturing technique, which frequently involves a series of energetic forays directed at flying insects. A flycatcher that eats anything it catches in the air will be at a selective advantage over one that wastes energy chasing moths it subsequently rejects. Foliage gleaners and other birds that search for resting and non-aerial insects will expend relatively little energy making investigatory pecks at insects that prove to be unpalatable.

Sound production

The production of ultrasonic clicks by the tymbal organ of *tessellaris* was reported by Roeder (*in* Blest, Collett & Pye, 1963: 205) and shown by Dunning (1968) to act as a warning of unpalatability to predatory bats. The tymbal organ of both sexes of all the *tessellaris*-group species is similar in structure, and it is therefore possible that it functions in the same way throughout the group. (The tymbal organ of *interlineata* was illustrated by Blest, Collett & Pye (1963) but without comment about its sound-producing capabilities.)

Evasive behaviour, first described by Roeder & Treat (1961) for noctuid moths, has also been recorded for *tessellaris* (Dunning & Roeder, 1965) in response to the echo-locating cries of bats. The experiments on *tessellaris* were carried out with tethered moths and there is no evidence to show whether evasion is a normal first-line defence tactic or possibly a response made after a threshold intensity of bat cries has been reached.

Systematic treatment

Characters used in the descriptions and key

Head

Colour of the clypeofrons, labial palps and the antennal scape. Shape of the apical segments of the antenna. Length of the longest antennal pectination in relation to the diameter of the antennal shaft at the base of this pectination (viewed laterally).

Thorax

Colour and markings of the dorsal surface; particularly the colour of the posterior fringe of the patagia and of the medial fringe of the tegulae, the colour of the longitudinal mid-dorsal line (if present) and the presence or absence of blue-green areas laterally. Colour and colour-pattern of the wings, particularly the forewings; especially the shape of the transverse fasciae, the intensity of black scaling bordering the costal elements of the fasciae, the reniform (discocellular marking) and along the wing veins, and the ground-colour of the wings. (The wing venation has not been found useful taxonomically.)

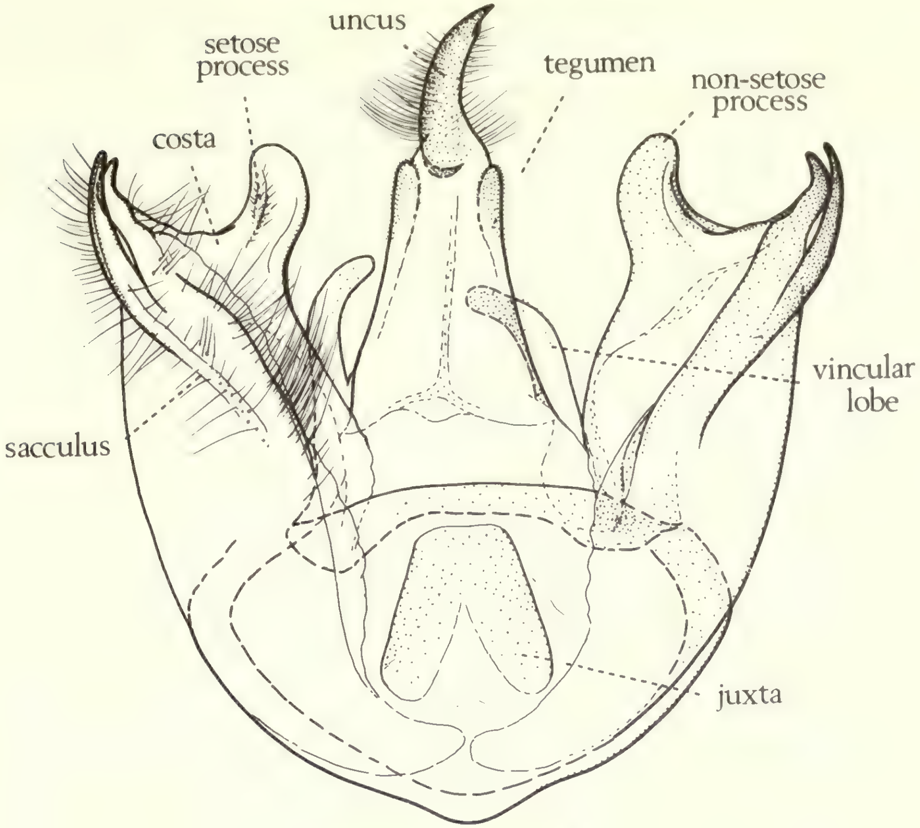
The tymbal organ is the apparently unique sound-producing organ found in many Arctiidae and some Ctenuchidae (see figures in Watson, 1975). Microtymbals are the minute ridges and furrows responsible for the production of sound (Blest, Collett & Pye, 1963).

Abdomen

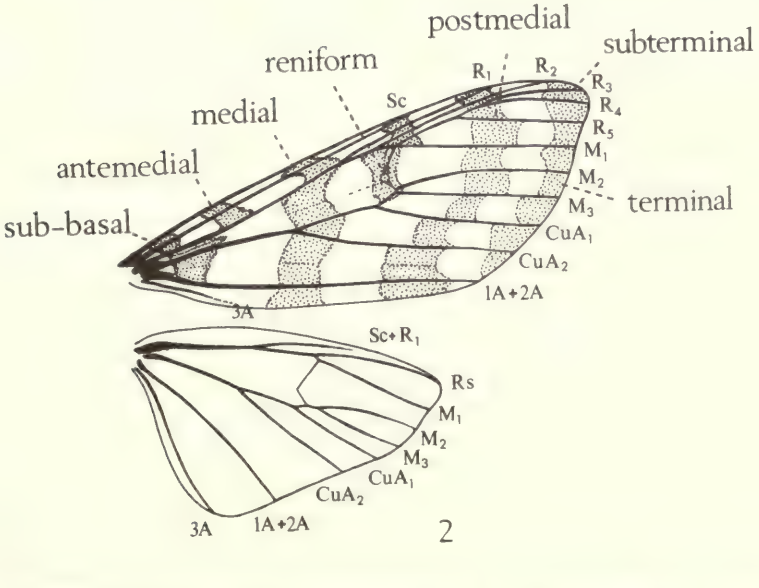
Colour of the dorsal surface; presence and number of black lateral spots (one spot on each side of a segment, forming a longitudinal line of spots). Male genitalia (Fig. 1): relative lengths of the apical processes of the costa and sacculus of valve; shape and size of the mid-costal processes; length of the lateral lobes of the vinculum, degree of development of the lateral lobes or shoulders of the tegumen; shape of the uncus; shape of the vesical lobes of the aedeagus, size of vesical spines and the extent of areas covered by spines.

It is important that the vesica of the aedeagus is everted during the preparation of the male genitalia so that the pattern of spines or scobinations on the lobes of the vesica can be examined.

It has not been possible to match males and females of all the species of *Halysidota* sensu stricto, but descriptive data concerning females are given wherever females have been identified


uncus
setose process
tegumen
non-setose process
costa
vincular lobe
sacculus
juxta

1


postmedial
subterminal
reniform
medial
antemedial
sub-basal
terminal
Sc
R₁
R₂
R₃
R₄
R₅
M₁
M₂
M₃
CuA₁
CuA₂
1A+2A
3A
Sc+R₁
Rs
M₁
M₂
M₃
CuA₁
CuA₂
3A
1A+2A

2

Figs 1, 2 (1) *Halysidota cinctipes*, ♂ genitalia, lectotype. (2) *H. tessellaris*, upper surface of wings, showing reniform marking, transverse fasciae and venation.

with reasonable certainty. The considerable individual variation in the shape of the pre-ostial plate and the ductus bursae of the few species examined indicates that the female genitalia may prove to be of limited value in species diagnosis.

Larval characters

In *tessellaris* and *harrisii* the coloration of the larvae is more useful diagnostically than the adult colour-pattern. It is likely that efforts to breed out other species of the *tessellaris*-group would prove to be rewarding.

Genus ***HALYSIDOTA*** Hübner

Halysidota Hübner, [1819]: 170. Type-species: *Phalaena tessellaris* Smith, *in* Smith & Abbot, 1797, by subsequent designation by Kirby, 1892: 209. *Halysidota* was the spelling adopted by Berg, 1882: 214, as first reviser, from a multiple original spelling which included both *Halysidota* and *Halisidota*.

Halesidota; Walker, 1855: 732. [Incorrect subsequent spelling.] Synonyms: I do not consider that any of the junior synonyms listed in the catalogue of Strand (1919: 67) should be accepted as such.

DESCRIPTION. ♂ and ♀. Clypeofrons yellow, or yellow with brown, black or grey markings; vertex yellow, grey or brown. Labial palps yellow; or yellow marked with black, brown or grey. Antennae yellow or brown; bipectinate; longest antennal pectination (♂) 1·5 to 4·0, (♀) 0·75 to 2·25 times width of shaft at that point. Thorax yellow, orange or brown dorsally, usually with blue-green margins to patagia and tegulae and blue-green mid-dorsal stripe. Each tegula with black spot or longitudinal stripe in most specimens of all species except *masoni* and *leda*. Ventral and lateral surfaces of thorax yellow or orange; with blue-green lateral patches in *cinctipes*. Tymbal organ with between ten and 20 microtymbals. Legs yellow or grey, with dark brown or black markings; mesothoracic tibia with one pair of spurs, metathoracic tibia with two pairs of spurs. Ground-colour of wings yellow, brown (*atra* and dark forms of *fuliginosa, pectenella* and *underwoodi*) or orange (*masoni*). Fasciae of forewing (Fig. 2) brown, black, or brownish yellow; darker than ground-colour of wings except in *atra* and dark forms of the three dimorphic species. Reniform marking (absent in *leda*) and costal part of postmedial and more proximal fasciae outlined with brown or black in many species, and more yellowish than rest of fascia except in *leda, elota, tessellaris, harrisii* and *meridionalis*. Wing veins marked with brown or black in some species. Basal and antemedial fasciae united to form single distinctive marking except in *leda* and *elota*. (A spot at anal margin of wing in some specimens of *fumosa*, and rarely in a few other species, may represent the posterior part of the antemedial fascia.) Medial fascia complete or incomplete; postmedial fascia represented by a costal and a discocellular marking or more fully developed (*leda* and *elota*); subterminal fascia complete or incomplete; terminal fascia usually complete, broadest apically. Hind wing much paler than forewing, usually becoming more yellowish anally; apex with or without small brown or black marking and rarely with further traces of terminal fascia along anterior two-thirds of outer margin. Abdomen yellow or brown dorsally, paler ventrally; with or without black dots or bars ventrolaterally on each side; sternite 8 with short membranous apodemes.

♂ genitalia (see Fig. 1). Saccus small; juxta approximately V-shaped. Valve with apical costal and saccular process and with non-setose, flattened, variously contorted process (very large in *cinctipes, ata, nigrilinea* and *yapacaniae*) at or distal to middle of costal margin, and with usually smaller setose process distal to non-setose process or at its base. Vinculum with digitate non-setose lobe on each side at junction with tegumen. Tegumen narrow, bearing spinose or scobinate (*orientalis*) shoulders or lobes posterolaterally. Uncus constricted (in ventral view) except in *fumosa*, acuminate apically; with strong pre-apical lateral flanges in *donahuei* and *instabilis*. Aedeagus moderately arcuate (in lateral view); vesica variously lobate, spinose and scobinate.

♀ genitalia as in Fig. 55. Large pre-ostial plate variously shaped but typically reniform.

VARIATION. There is considerable individual variation in the pattern of wing-markings of *schausi, davisii, underwoodi, cinctipes* and *fumosa* (see figures). The colour of these markings and the ground-colour of the wings is, however, less variable and it is usually possible to identify tentatively most specimens of *Halysidota* sensu stricto prior to an examination of the male genitalia. There is some variation in the shape and size of the various parts of the male genitalia, particularly the uncus, lateral lobes of the tegumen and the vincular lobes. The shape and size of the ostial plate and ductus bursae in the female genitalia are also variable individually, to such an extent that they are probably not of use in separating species.

Three species are dimorphic in wing colour, having a yellow form and a dark brown or melanic form. *H. fuliginosa* and *pectenella* are known from numerous yellow specimens of both sexes and from a single brown male in each species. *H. underwoodi* is a normally yellow species but is also known from several males and females of the brown form.

H. atra is the only species distinctively sexually dimorphic in coloration (males are dark brown, females much less dark) and is the only species not represented by a yellow form in any of the collections studied.

Table 1 Foodplants of *tessellaris*-group larvae

Plant species	Plant family	Moth species	Country	Source of record
Acalypha ?macrostachya	Euphorbiaceae	*underwoodi*	Venezuela	Fox (1978)
Celtis spinosa	Ulmaceae	*?brasiliensis*[2]	Argentina	Hayward (1969)
		schausi[1]	Brazil	Silva *et al.* (1968)
		steinbachi	Argentina	Hayward (1969)
		?tucumanicola[2]	Argentina	Hayward (1969)
Celtis spp.	Ulmaceae	*?brasiliensis*[2]	Argentina	Hayward (1969)
		schausi[1]	Brazil	Silva *et al.* (1968)
		steinbachi	Argentina	Hayward (1969)
		?tucumanicola[2]	Argentina	Hayward (1969)
Cestrum nocturnum	Solanaceae	*schausi*[1]	Brazil	Silva *et al.* (1968)
Coccoloba floridana	Polygonaceae	*cinctipes*	U.S.A.	Dyar (1896)
Coccoloba uvifera	Polygonaceae	*cinctipes*	U.S.A.	Dyar (1896)
Hibiscus sp.	Malvaceae	*cinctipes*	Cuba	Gundlach (1881)
Morus sp.	Moraceae	*interlineata*	Brazil	Lima (1936)
Phrygilanthus acutifolius	Loranthaceae	*brasiliensis*	Brazil	Silva *et al.* (1968)
Platanus occidentalis	Platanaceae	*harrisii*	North America	Dyar (1891), Forbes (1960)
		tessellaris	North America	Kimball (1965)
Ruellia longifolia	Acanthaceae	*steinbachi*	Argentina	Hayward (1969)
Trema micrantha	Ulmaceae	*brasiliensis*	Brazil	d'Almeida (1929)
		?tessellaris	U.S.A.	Slosson (1901)
Trema sp.	Ulmaceae	*?brasiliensis*[2]	Argentina	Hayward (1969)
		?tucumanicola[2]	Argentina	Hayward (1969)
Various broad-leaved trees		*tessellaris*	North America	Forbes (1960)

[1] cited as *pallida*, a junior synonym

[2] cited as *schausi*, a probable misidentification.

EARLY STAGES. Little is known. Dyar (1891) described the egg of *harrisii*, and the larva, pupa and cocoon of both *harrisii* and *tessellaris*; Gundlach (1886) described the larva of *cinctipes*; and d'Almeida (1929) described the egg, larva, pupa and cocoon of *brasiliensis*. Mrs Avril Fox recently reared *underwoodi* in Venezuela (unpublished); some of her findings are recorded in Table 1 and on p. 40. The foodplants listed in Table 1 include several introduced or ornamental species and are probably atypical sources of food for the *Halysidota* species concerned (but see also 'Warning coloration', p. 5).

The larva of *tessellaris* (the Pale Tussock or Banded Tussock) is a minor pest of various broad-leaved forest and roadside trees in eastern United States and southern Canada. *H. harrisii* (the Sycamore Tussock) is common in north-eastern states of the U.S.A. on American Sycamore (*Platanus occidentalis*).

DISTRIBUTION. As shown in Table 2, the *tessellaris*-group is endemic to the New World and is chiefly tropical and subtropical in range. Only two species, *tessellaris* and *harrisii*, occur in the northern states of the U.S.A. and in Canada.

The two species with colour-patterns atypical of their group, *elota* (Jamaica) and *leda* (Guadeloupe and Dominica), may have become detached from ancestral *tessellaris*-group species during the period when the proto-Antilles were becoming established (Rosen, 1975). Subsequent radiation in Central and South America has produced the 27 species with a *tessellaris*-like colour-pattern (Fig. 2). Three of these are known from the Antilles: *cinctipes* and its vicariant *ata*, and the St Lucian *insularis*. The latter is closely similar to and possibly monophyletic with *tessellaris, harrisii* (North America) and *meridionalis* (Mexico) and probably owes its origin in St Lucia to dispersal and subsequent vicariance, not fragmentation of an ancestral fauna. The origin of *cinctipes* and *ata* is less clear. *H. cinctipes* is represented in Florida as well as neighbouring Cuba and the Bahamas, and could have had an ancestral Central American – Mexican – southern United States distribution or could have evolved in the Greater Antilles after arrival from Central America and subsequently crossed the short expanse of sea to Florida. (The latter explanation accords with the ideas of Scott (1972) concerning the origin of the Antillean butterflies.)

Table 2 is based on material examined during the preparation of this paper. The arrangement of countries follows a north to south sequence from North America, through Central America to Colombia, then west to east to French Guiana, followed by a north to south sequence from Ecuador to Argentina (including Brazil which is placed arbitrarily after Bolivia).

Table 2 Distribution of *Halysidota* sensu stricto

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Canada	×																												
U.S.A.	×		×			×	×						×			×					×								
Mexico	×	×				×	×						×	×		×	×	×	×	×							×		
Antilles				×																	×	×						×	×
Guatemala							×						×	×		×	×	×						×	×				
Belize																									×				
El Salvador													×				×												
Honduras							×						×					×						×					
Nicaragua							×									×		×											
Costa Rica							×						×	×		×	×	×						×		×			
Panama														×		×	×	×							×				
Colombia							×							×		×	×	×						×	×	×			
Venezuela							×							×		×	×							×	×				
Trinidad														×															
Guyana														×															
Surinam																									×				
French Guiana														×			×								×				
Ecuador							×							×		×	×	×						×		×			
Peru							×							×	×	×	×	×						×					
Bolivia									×			×		×		×	×	×						×					
Brazil								×			×	×		×											×				
Paraguay								×			×																		
Uruguay					×																				×				
Argentina					×					×		×																	
Chile														×															

Key to column figures:
1, *tessellaris*; 2, *meridionalis*; 3, *harrisii*; 4, *insularis*; 5, *ruscheweyhi*; 6, *davisii*; 7, *schausi*; 8, *brasiliensis*; 9, *yapacaniae*; 10, *tucumanicola*; 11, *pearsoni*; 12, *steinbachi*; 13, *fuliginosa*; 14, *orientalis*; 15, *conflua*; 16, *underwoodi*; 17, *pectenella*; 18, *atra*; 19, *instabilis*; 20, *donahuei*; 21, *cinctipes*; 22, *ata*; 23, *nigrilinea*; 24, *intensa*; 25, *interlineata*; 26, *fumosa*; 27, *masoni*; 28, *elota*; 29, *leda*.

Key to species (males)

Colour-pattern characters refer to the upper surface of the forewing unless otherwise stated.

1	Sub-basal and antemedial fasciae united to form distinctive marking at base of forewing (Fig. 2); reniform (discocellular) marking conspicuous; postmedial fascia present only at costa	2
–	Base of forewing without marking depicted in Fig. 2; reniform marking absent or indistinct; postmedial fascia confluent anally with medial fascia, or not confluent with medial fascia and unbroken from costa to anal margin, or absent except on extreme costal margin of forewing	29
2	Ground-colour bright orange; terminal fascia absent (Fig. 48). Patagia and tegulae unicolorous	***masoni*** (p. 57)
–	Ground-colour yellow or brown; terminal fascia present. Patagia and tegulae usually fringed with blue-green, greenish blue or greenish grey	3
3	Clypeofrons pale yellow, without markings	4
–	Clypeofrons partly black, dark brown or grey	6
4	Apical costal process of valve extending distal to apical saccular process (Fig. 51)	5
–	Apical saccular process extending distal to apical costal process (Fig. 49)	***harrisii*** (p. 20)
5	Medial fascia tapered towards anal margin (Fig. 5). Forewing at least 28 mm in length	***meridionalis*** (p. 21)
–	Medial fascia not tapered anally (Fig. 3). Forewing 27 mm in length or shorter	***tessellaris*** (p. 12)
6	Terminal fascia incomplete	7
–	Terminal fascia complete	8
7	Ground-colour pale yellow	***davisii*** (p. 24)
–	Ground-colour dark brown	***atra*** (p. 42)
8	Medial, subterminal and terminal fasciae partly confluent (Figs 22, 23)	***conflua*** (p. 38)
–	Above fasciae not confluent	9
9	Subterminal fascia represented by costal and anal marking, by one of these markings, or absent	***interlineata*** (p. 54)
–	Subterminal fascia with at least one other subterminal marking in addition to costal and anal markings	10
10	Medial, subterminal and terminal fasciae hardly distinguishable from rest of wing except at costa (Fig. 11)	***ruscheweyhi*** (p. 22)
–	Transverse fasciae distinctly marked	11
11	Markings heavily outlined with black in costal area (e.g. Fig. 28)	12
–	Markings not as above	16
12	Outer margin of forewing nearly straight; very heavily marked (Figs 43, 44). Genitalia as in Figs 90, 91	***intensa*** (p. 52)
–	Outer margin of forewing more strongly arcuate and less heavily marked than in Figs 43, 44. Genitalia other than in Figs 90, 91	13
13	Genitalia as in Figs 74, 75; uncus weakly dilated pre-apically	14
–	Genitalia other than in Figs 74, 75; uncus strongly dilated pre-apically	15
14	Subterminal fascia narrow, incomplete (Fig. 34); postmedial and more proximal fascia heavily outlined with black in costal area; apex of antenna as in Fig. 76	***pectenella*** (p. 41)
–	Subterminal fascia generally broader and complete; fasciae usually not heavily marked costally (Figs 27–33); apex of antenna as in Fig. 77.	***underwoodi*** (p. 38)
15	Lateral margins of uncus greatly expanded (Fig. 80)	***instabilis*** (p. 45)
–	Lateral margins of uncus as in Fig. 82	***donahuei*** (p. 47)
16	Fasciae bordered by black, then by greyish white scales (Fig. 18)	***steinbachi*** (p. 33)
–	Fasciae without white scales	17
17	Uncus (usually visible in pinned specimens) as in Fig. 94	***fumosa*** (p. 56)
–	Uncus more slender than in Fig. 94	18
18	Non-setose costal lobe of valve very large (as in Fig. 56) or longer	19
–	Non-setose costal lobe of valve less well-developed than in Fig. 56.	22
19	Veins intersecting fasciae dark brown or black (Fig. 45); margins of subterminal fascia not lunulate	***nigrilinea*** (p. 50)
–	Veins intersecting fasciae less well marked than in Fig. 45; margins of subterminal fascia lunulate	20
20	Costal markings of fasciae distinctly yellow; veins intersecting fasciae moderately well marked (Fig. 15). Apical costal process of valve extends distal to apical saccular process; vesica as in Fig. 61	***yapacaniae*** (p. 29)

– Costal markings of fasciae not distinctly yellow; veins intersecting fasciae unmarked or weakly marked (Fig. 40). Apical saccular process extends distal to apical costal process (Fig. 84); vesica as in Figs 86 or 87 21

21 Blue-green patch on thorax ventral to base of forewing and another ventral to eye. Vesical spines as in Fig. 86 . . . . ***cinctipes*** (p. 47)

– Thorax without blue-green patches laterally. Vesical spines as in Fig. 87 . . . . . ***ata*** (p. 50)

22 Vincular lobes about as wide as long 23

– Vincular lobes 1·5 to 3·0 times as long as least width 24

23 Vesica of aedeagus distinctly spinose (Fig. 75); apical costal process of valve extending distal to apical saccular process (Fig. 74) 14

– Vesica of aedeagus scobinate, not distinctly spinose; apical costal process of valve not extending distal to apical saccular process 24

24 Postmedial and more proximal fasciae more heavily outlined with black in costal area than elsewhere (Fig. 17) Apical processes of valve extending distally about same distance (Fig. 64) ***pearsoni*** (p. 32)

– Fasciae fairly evenly outlined with black (Fig. 16). Apical saccular process of valve extending distal to apical costal process (Fig. 62) . . . . ***tucumanicola*** (p. 30)

25 Postmedial and more proximal fasciae of forewing more heavily outlined with black in costal area than elsewhere (Fig. 21). Lobes of tegumen crenulate; angulate in ventral view (Fig. 70) ***orientalis*** (p. 36)

– Fasciae usually not or only slightly more heavily outlined with black in costal area of forewing. Lobes of tegumen spinose; not angulate in ventral view 26

26 Ground-colour of wings brownish orange; subterminal fascia usually confluent with terminal fascia at middle of outer margin of forewing (Fig. 20). Setose and non-setose mid-costal processes of valve about equal in size; vesica as in Fig. 69 . . . . . ***fuliginosa*** (p. 33)

– Ground-colour of wings yellow or buff; subterminal fascia rarely confluent with terminal fascia. Non-setose costal process distinctly larger than setose costal process of valve; vesica not as in Fig. 69 27

27 Fasciae yellow in costal area; lobes of tegumen large, strongly spinose (as in Fig. 56); vesica strongly spinose, as in Fig. 57 . . . . ***schausi*** (p. 26)

– Fasciae brownish yellow in costal area; lobes of tegumen smaller, not as in Fig. 56; vesica less strongly spinose than in Fig. 57 28

28 Antemedial fascia broad (Fig. 14); non-setose mid-costal process of valve well developed (Fig. 58) . . . . ***brasiliensis*** (p. 29)

– Antemedial fascia narrow (Fig. 6); non-setose mid-costal process of valve smaller (Fig. 51) ***insularis*** (p. 22)

29 Sub-basal and antemedial fasciae confluent costally, medial and postmedial fasciae confluent anally (Fig. 101). Tegulae without black spot; dorsal surface of thorax with longitudinal mid-dorsal line . . . . ***elota*** (p. 58)

– Fasciae, if present, continuous from costa to anal margin (Fig. 102). Tegulae with black spot anterolaterally; dorsal surface of thorax without markings . . . . ***leda*** (p. 59)

Halysidota tessellaris (Smith)

(Figs 2–4, 51)

Phalaena tessellaris Smith, 1797: 149, pl. 75. Syntypes, U.S.A. [not examined].

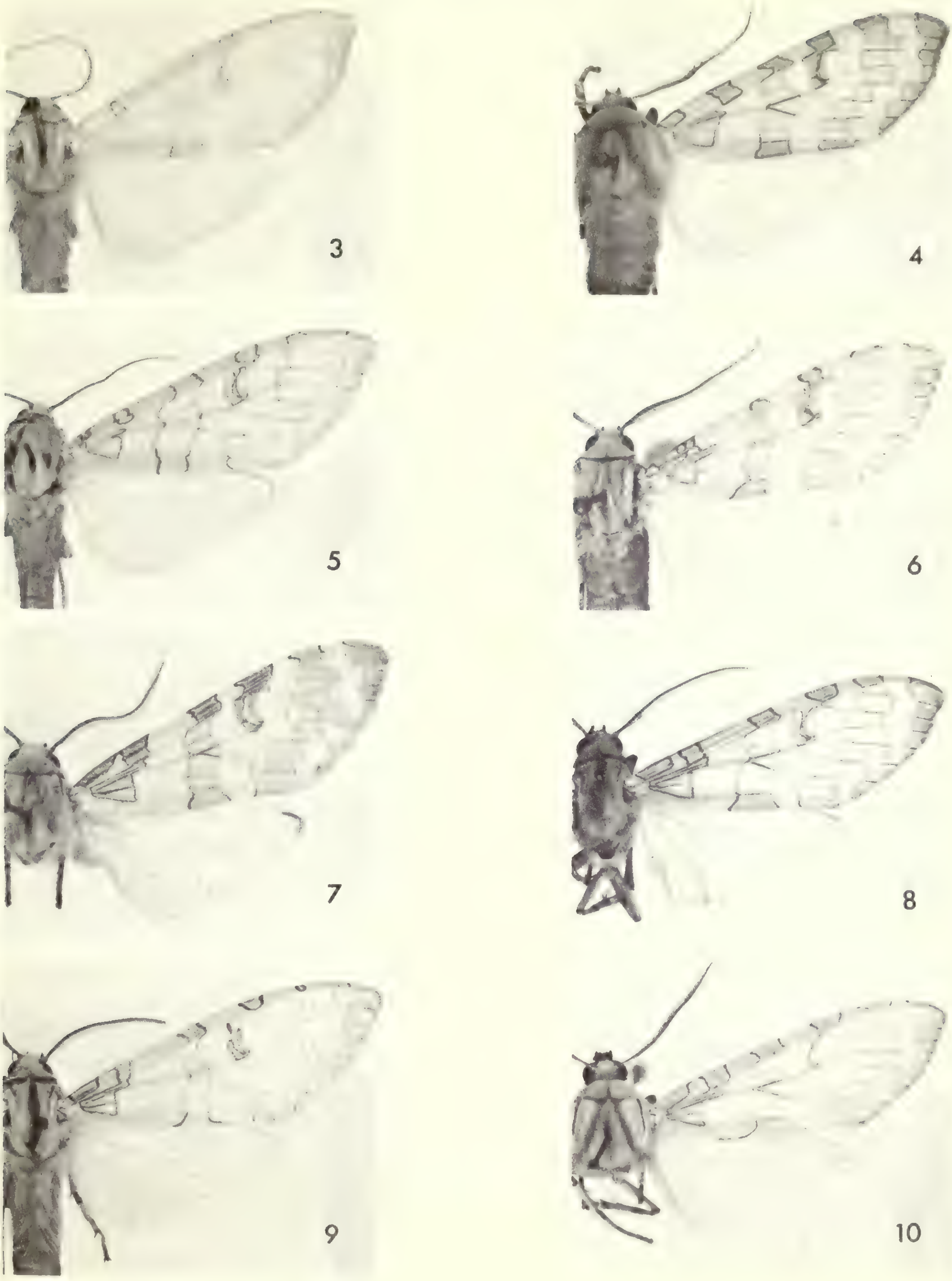
Halesidota (*Lophocampa*) *antiphola* Walsh, 1864*a*: 288. ♂, ♀ syntypes, U.S.A: Illinois, Rock I. (probably lost). [Synonymized by Walsh, 1864*b*: 429.]

Halisdota oslari Rothschild, 1909: 283. LECTOTYPE ♂, U.S.A. (BMNH), here designated [examined]. [Synonymized by Travassos, 1963: 476.]

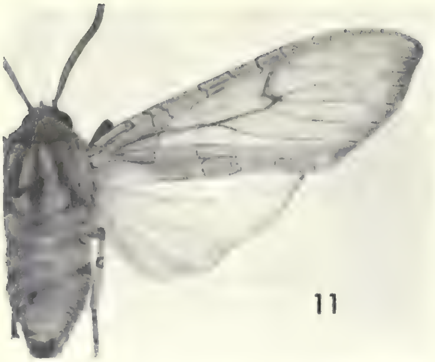
Halisidota tessellaris ab. *antipholella* Strand, 1919: 84. Holotype ♀, U.S.A. (BMNH) [examined]. [Infrasubspecific name.]

Halisidota tessellaris ab. *tesselaroides* Strand, 1919: 85. Holotype ♂, U.S.A. (BMNH) [examined]. [Infrasubspecific name.]

DESCRIPTION. ♂. Forewing: ♂, 23–27 mm. Head yellow, without markings on clypeofrons. Basal segment of palp yellow, rarely with black scales proximally; second segment pale yellow, with brown or black proximally in most specimens and distally in few specimens; apical segment brown or black, usually with pale yellow distally. Antenna pale yellow dorsally; longest antennal pectination between four and five times



Figs 3–10 *Halysidota*, wings, upper surface. (3) *tessellaris* ♀, Ontario. (4) *tessellaris* ♂, Florida. (5) *meridionalis* ♀, Mexico. (6) *insularis*, paratype ♂, St Lucia. (7) *schausi* ♂, Texas, Brownsville. (8) *schausi* ♂, Venezuela. (9) *schausi* ♂, Mexico. (10) *schausi*, lectotype ♂.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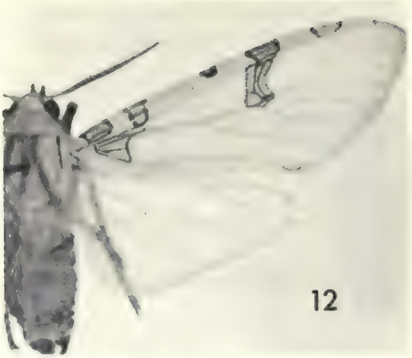
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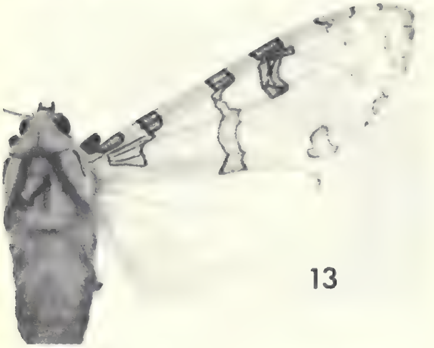
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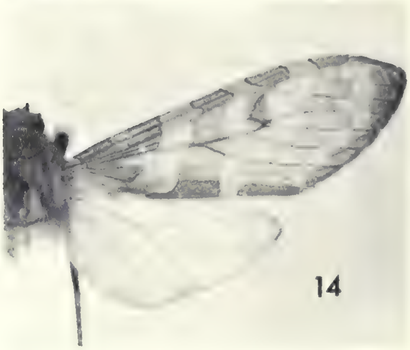
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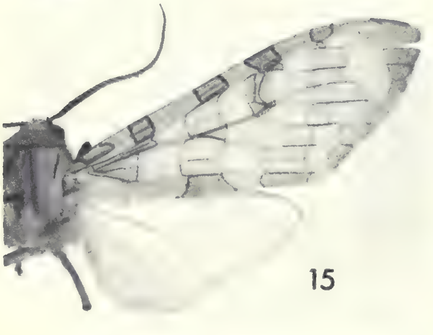
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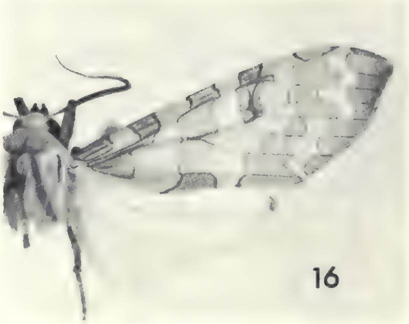
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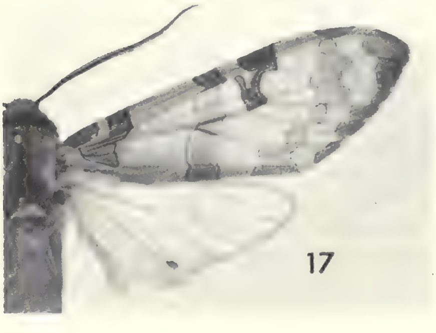
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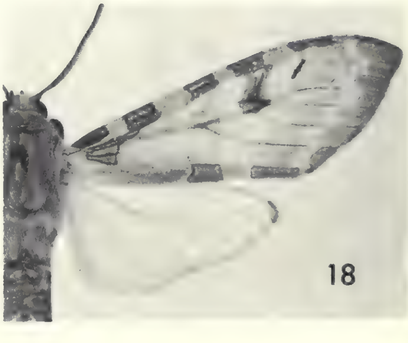
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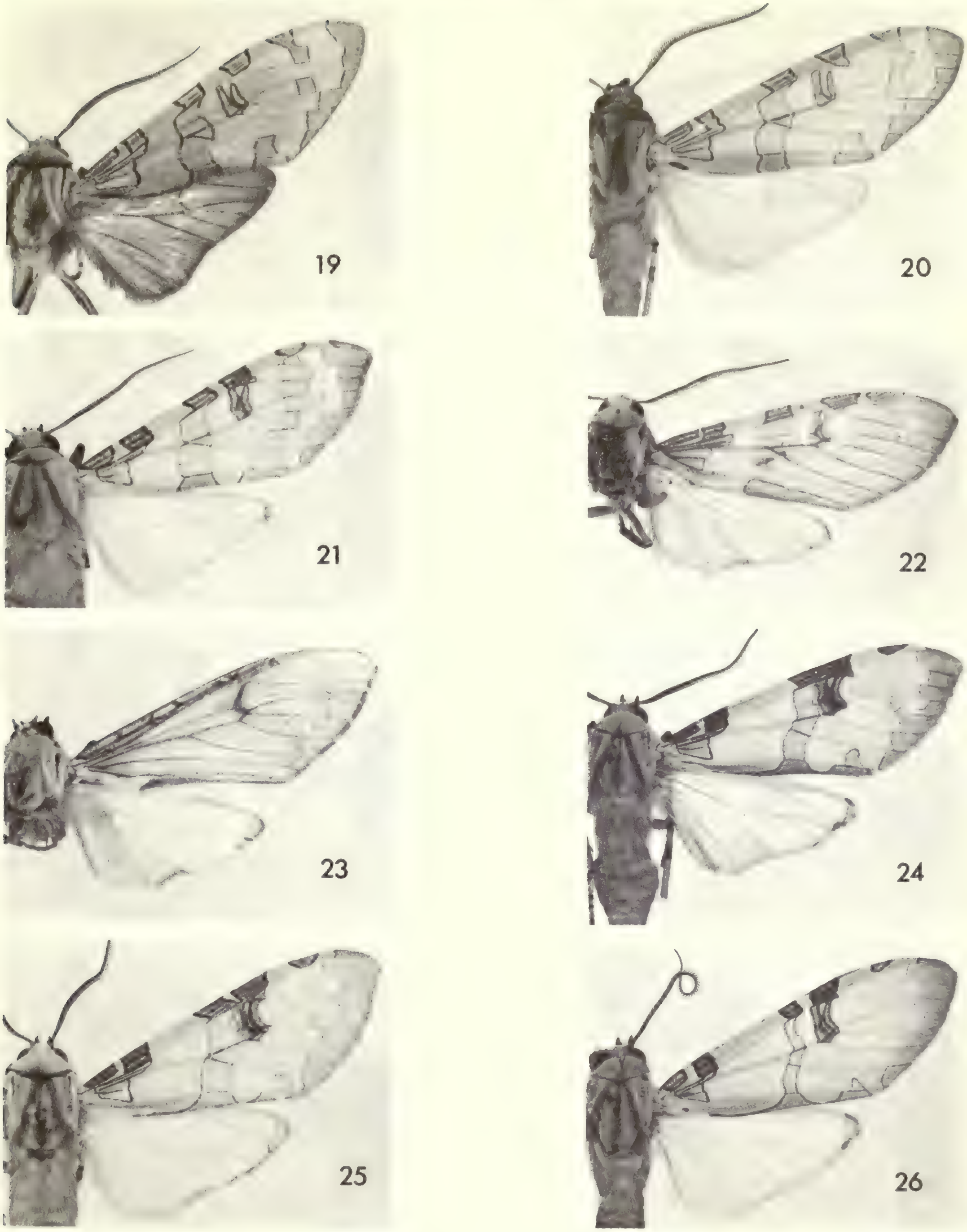
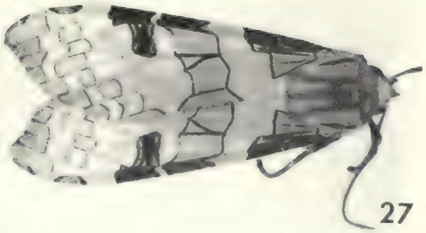
Figs 11–18 *Halysidota*, wings, upper surface. (11) *ruscheweyhi* ♂, Argentina. (12) *davisii* ♂, Arizona, Nogales. (13) *davisii* ♂, Arizona, Prescott. (14) *brasiliensis* ♂, São Paulo. (15) *yapacaniae* ♂, Bolivia. (16) *tucumanicola*, lectotype ♂. (17) *pearsoni* paratype ♂, Sta Catarina. (18) *steinbachi* ♂, Argentina.



Figs 19–26 *Halysidota*, wings, upper surface. (19) *fuliginosa*, lectotype ♂. (20) *fuliginosa* ♂, Guatemala. (21) *orientalis* ♂. (22) *conflua*, holotype ♂, left-hand wings, negative reversed. (23) *conflua*, paratype ♂. (24) *instabilis* ♂. (25) *donahuei*, paratype ♂. (26) *instabilis*, lectotype ♂.



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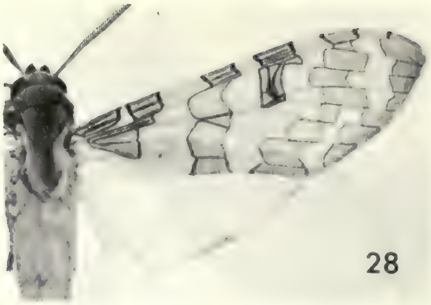

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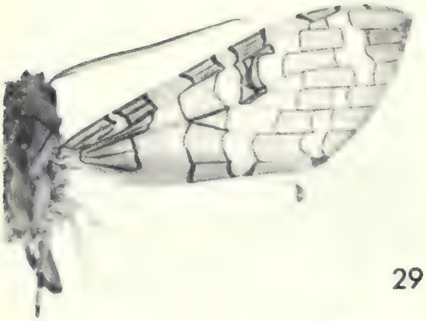

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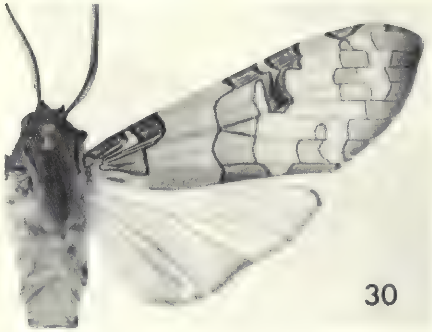

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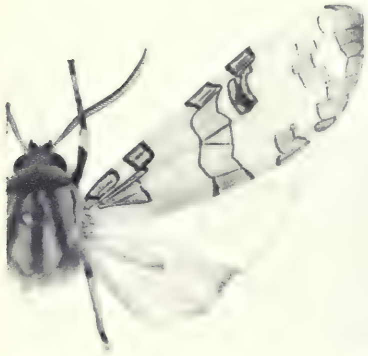

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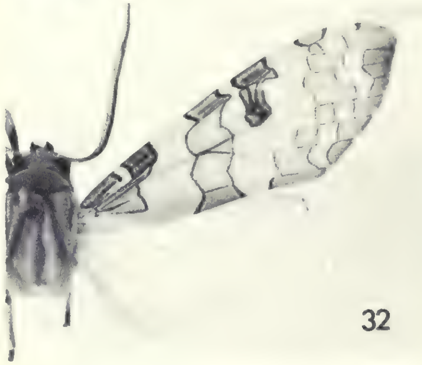

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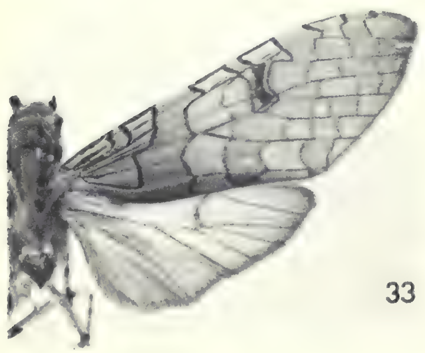

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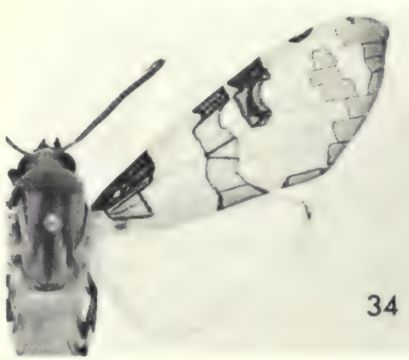

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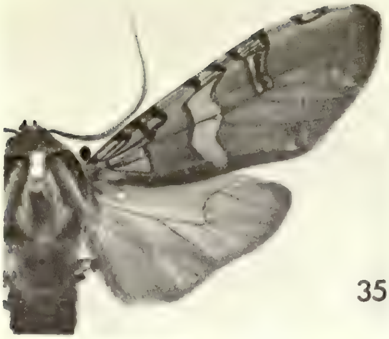
Figs 27–34 *Halysidota*, wings, upper surface. (27–33) *underwoodi*. (27) ♂, Venezuela. (28) ♂, Venezuela. (29) lectotype ♂ of *meridensis*. (30) ♂, Guatemala. (31) ♂, Costa Rica. (32) ♂, Costa Rica. (33) lectotype ♂ of *bricenoi*. (34) *pectenella* ♂, Guatemala.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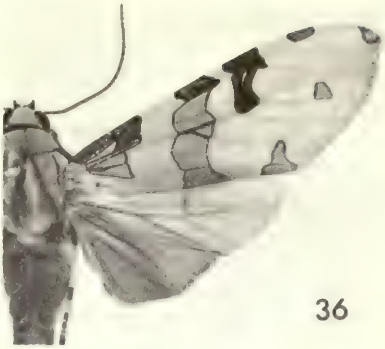
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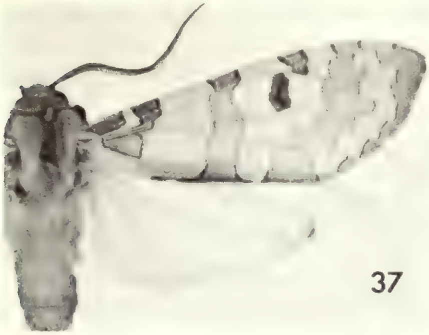
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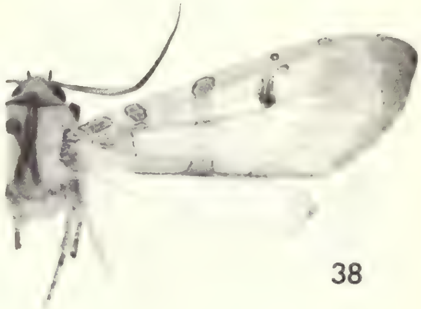
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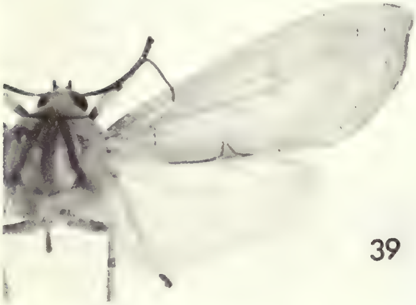
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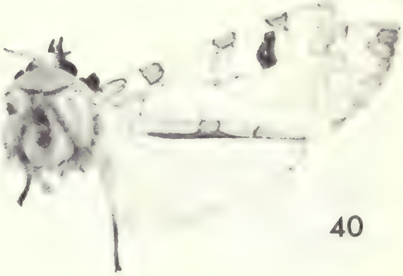
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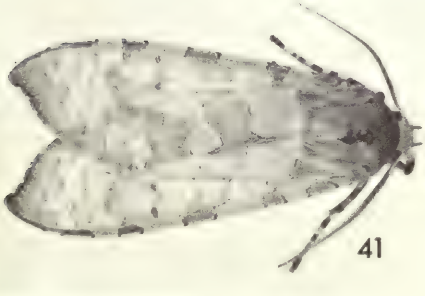
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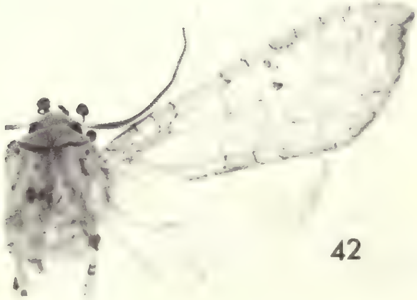
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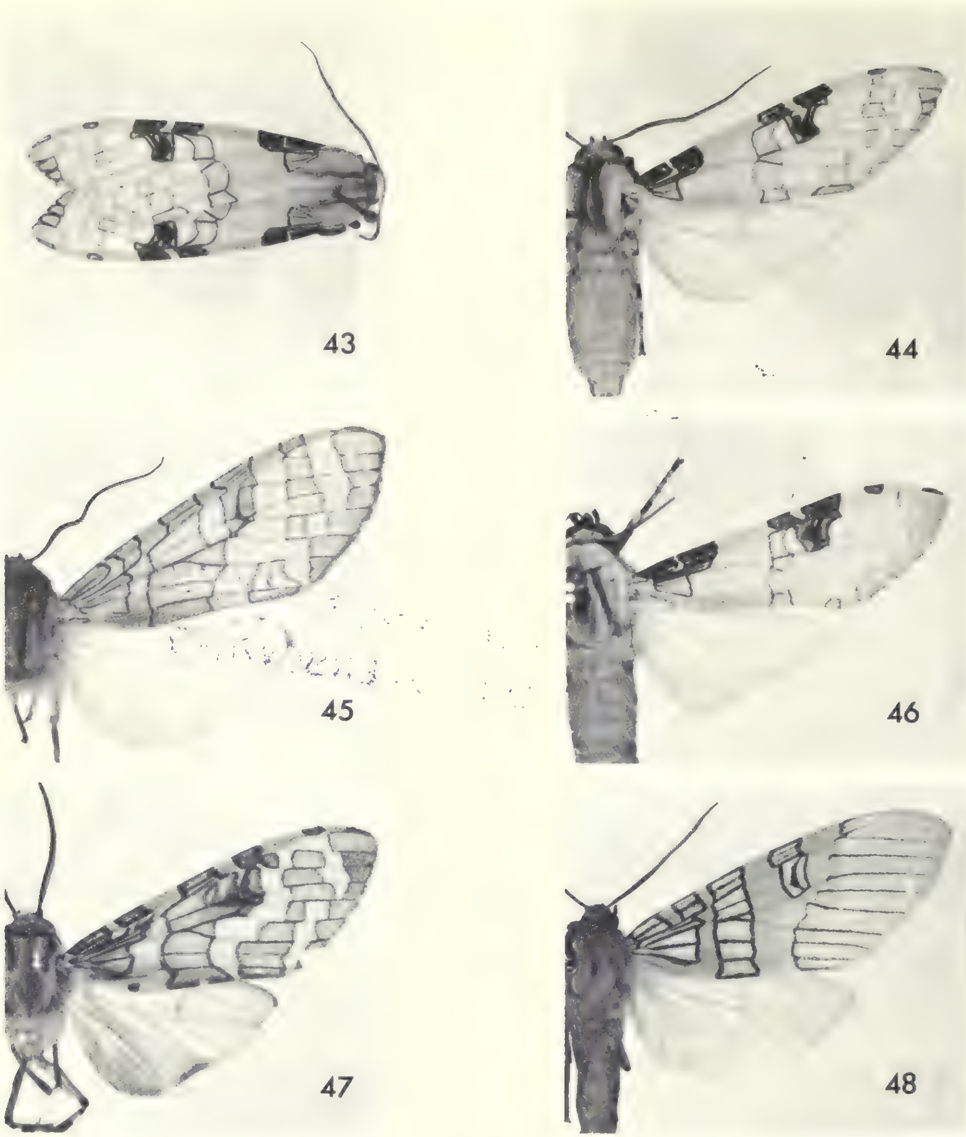
Figs 35–42 *Halysidota*, wings, upper surface. (35) *atra* ♂, Mexico. (36) *atra* ♀, Guatemala. (37) *cinctipes* ♂, Cuba. (38) *cinctipes* ♂, Florida. (39) *cinctipes* ♀, Florida. (40) *ata*, holotype ♂. (41) *ata* ♂, Puerto Rico. (42) *ata* ♂, Puerto Rico.



Figs 43–48 *Halysidota*, wings, upper surface. (43) *intensa* ♂, Peru. (44) *intensa* ♀, Guatemala. (45) *nigrilinea* ♀, Guatemala. (46) *interlineata* ♂, Brazil. (47) *fumosa* ♂, Costa Rica. (48) *masoni* ♀.

diameter of shaft at that point. Patagia pale yellow with greenish blue posterior margin. Tegulae pale yellow, bordered medially and posteriorly with greenish blue; each with black spot at anterolateral corner in some heavily marked specimens. Rest of thorax orange-yellow, with greenish blue or bluish grey mid-dorsal line. Outer surface of legs orange-yellow, inner surface pale yellow; usually with black or black-bordered pale grey markings. Microtymbal number: 16 to 18. Forewing pale buff or yellowish white above; markings more brownish, bordered with black or dark brown; under surface paler, and markings less distinct, especially at costa. Both surfaces of hind wing yellowish white, becoming pale yellow in anal region; brown apical marking present in a few specimens. Abdomen orange-yellow dorsally, pale yellow ventrally; without markings.

♂ genitalia. Apical costal process of valve extending distal to apical process of sacculus; non-setose mid-costal process of valve forming dorsally directed lip. Vincular lobe about three times as long as least width. Lobes of tegumen moderately well developed; spines just visible at × 32 magnification. Uncus slender at middle. Large tapered anterior lobe of vesica with two smaller ventrolateral lobes on left-hand side and with large posterior lobe and single posterolateral lobe on right-hand side.

DIAGNOSIS. Probably not distinguishable on male genitalic characters from *meridionalis*, but differs in size and colour-pattern. *H. tessellaris* is smaller (♂ forewing 23–27 mm) than *meridionalis* (28–30 mm) and few specimens exhibit the anally tapered medial fascia of the forewing of most specimens of *meridionalis*. A possible additional diagnostic character is the colour of the margins of the patagia and tegulae which are distinctly green in most specimens of *tessellaris* but are only faintly greenish grey in the few available specimens of *meridionalis*.

The adult male moth is probably indistinguishable from *harrisii* in colour-pattern and colour, but the shape of the valve apex is diagnostic (Figs 49, 51) (most collections are likely to contain both species unless examined for this character). The hair-pencils of the final instar larva are black and white, in contrast to the orange and white hair-pencils of *harrisii* (Dyar, 1891). Bred series (not available to me) are needed before female diagnostic features can be investigated.

VARIATION. The 'aberration' *antipholella* Strand is a pale-coloured but otherwise normal female specimen of either *tessellaris* or *harrisii*. The specimen named *tesselaroides*, described by Strand as an individual variant of *tessellaris*, is an unusually large male with abbreviated fasciae. Specimens with darker fasciae (Fig. 4) are normal in Florida (Kimball, 1965) and Louisiana and occur less frequently in more northerly states.

SYNONYMY OF *H. oslari*. None of the characters listed by Rothschild (1909: 16) as diagnostic for *oslari* is tenable. The forewings are not 'much rounder', the margins of the patagia and tegulae do not exhibit an 'absence of green' in the male, and the 'sooty grey' tarsi are buff or yellow in colour but encrusted with soot or detritus. The margins of the wings of the lectotype and most paralectotypes are similarly contaminated and consequently are dark grey in colour. Travassos's (1963: 476) placement of *oslari* in the synonymy of *tessellaris* is confirmed.

TYPE-MATERIAL AND FOODPLANTS. Smith (1797) records specimens from *Fagus, Carpinus* and *Platanus*, and his syntypic series may, therefore, have included specimens of *harrisii* which feed as larvae almost exclusively on *Platanus occidentalis*. *H. tessellaris* has been recorded from *Platanus occidentalis* (Kimball, 1965: 76) but is rarely found on the foliage of this tree, though often common on numerous other broad-leaved trees in the U.S.A. and Canada (Tietz, 1972: 630–637), where it can become a minor pest, and has been reported also on *Zea mays*. Smith's (1797) figures, however, leave no doubt that the name *tessellaris* should be associated with the species currently recognized as *tessellaris*. The two moths illustrated by Smith are fairly typical of the darker south-eastern form of *tessellaris* as currently accepted, and the larva, with black hair-pencils, is a corresponding early stage of this species.

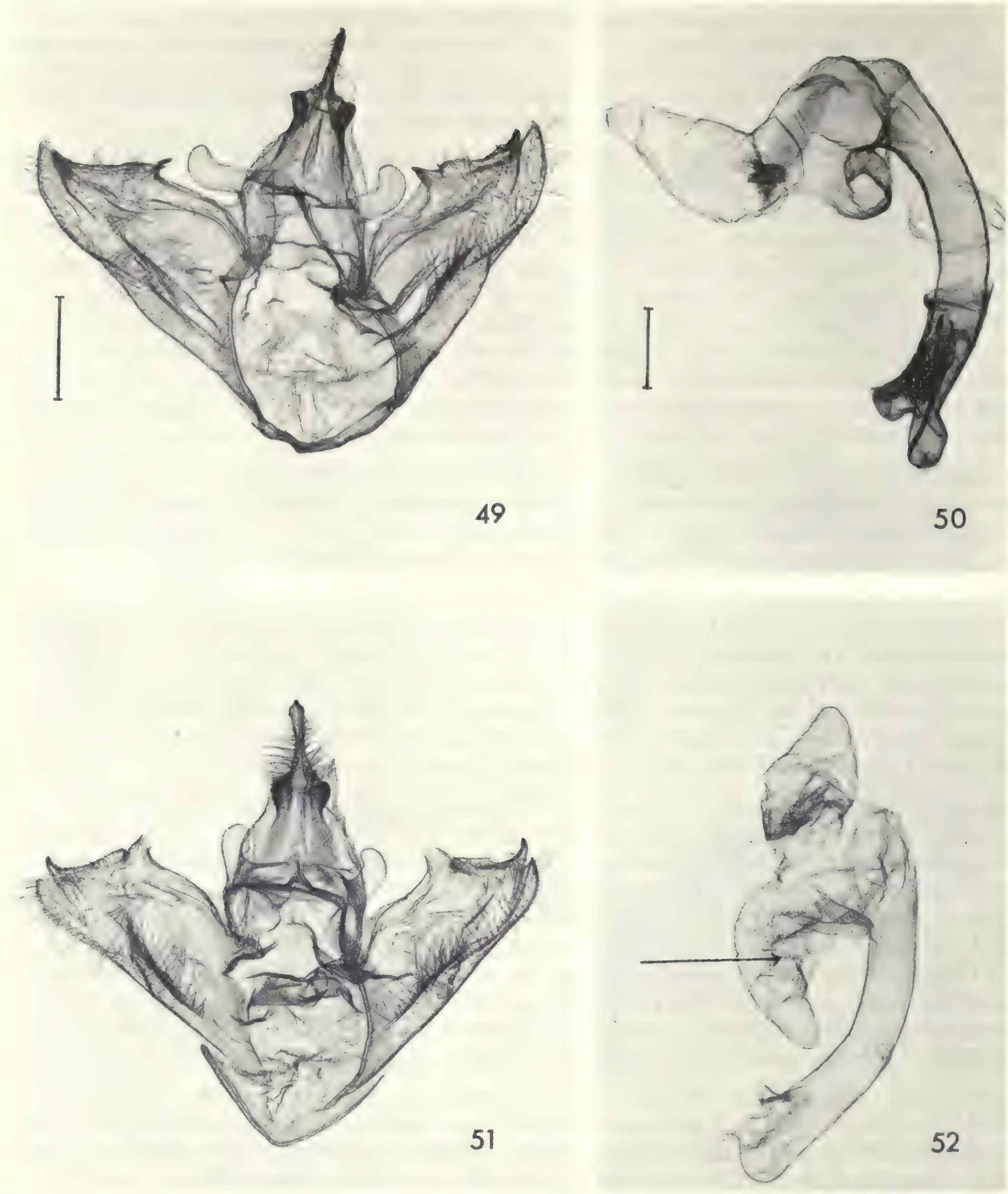
STATUS. Only two (*oslari* and *antiphola*) of the 22 species-group names listed by Travassos (1963: 475–477) as junior synonyms of *tessellaris* are accepted here as such. Reference to the index to this paper will indicate the present status of these names, some of which are reinstated as valid species names and others shown to be junior synonyms of species other than *tessellaris*. None of the illustrations of wings given by Travassos (1963) is of *tessellaris*.

DISTRIBUTION. *H. tessellaris* extends from Canada southwards to Florida and Texas and westwards as far as Arizona. There are no records from the lower Rio Grande valley where *tessellaris* may have been replaced by *schausi* (see p. 26), but there is a single specimen labelled 'Mexico, M. Sallé' in the BMNH.

MATERIAL EXAMINED

Halisidota oslari Rothschild, lectotype ♂, **U.S.A.**: Colorado, Denver (Oslar) (BMNH).

Canada: Ontario and Quebec. **U.S.A.**: Wisconsin, Iowa, Massachusetts, New York, Pennsylvania, Maryland, West Virginia, Virginia, District of Columbia, North Carolina, Georgia, Florida, Mississippi, Arkansas, Louisiana, Texas, Arizona, Colorado. **Mexico**: 'Mexico'.



Figs 49–52 *Halysidota* ♂ genitalia. (49) *harrisii*, slide 2338, Kentucky. (50) *harrisii*, slide 1138, N.Y. state. (51) *tessellaris*, slide 2337, Wisconsin. (52) *insularis*, USNM slide, St Lucia.

Halysidota harrisii Walsh **sp. rev.**

(Figs 49, 50)

[*Lophocampa tessellaris* (Smith); Harris, 1841: 260. Misidentification.]
Halesidota harrisii Walsh, 1864*b*: 430. Type-material lost (see below).

DIAGNOSIS. ♂. Forewing: ♂, 24–26 mm. Not distinguishable externally with certainty from *tessellaris*, but most specimens lack black markings on the basal segment of the palp, whereas in *tessellaris* these black markings may be either present or absent. The shape of the valve, in which the saccular process is the longer of the two apical processes, is diagnostic, however, and it is usually possible to examine the valves of a pinned specimen by wetting the surrounding scales. ♀ : see *tessellaris*.

The larva is readily separable from that of *tessellaris*. The final instar larva of *harrisii* has a yellow or brown head and chiefly orange anterior dorsal hair-tufts; in *tessellaris* the larval head is black and the hair-tufts black.

TYPE-MATERIAL. Walsh (1864*b*) proposed the name *harrisii* for the 'crested caterpillar' of Harris (1841: 259) (now the 'Sycamore Tussock') stated by Harris to be 'very common, throughout the United States on the button-wood or sycamore'. It is doubtful whether any larva of *harrisii* in Walsh's hands at the time of description exists today, and it would be necessary to establish a neotype if any doubt arose about the identity of *harrisii*.

STATUS. The name *harrisii* is here removed from the synonymy of *tessellaris* in which it was placed by Travassos (1963: 475).

LARVA. Dyar (1891: 163) described the egg, seven larval instars, the pupa and the cocoon of this species. He gave as the foodplant the native North American 'Sycamore' (*Platanus occidentalis*) but quoted the scientific name in error as *Acer pseudo-platanus*, the European Sycamore, which is known in North America solely as an introduced ornamental tree.

DISTRIBUTION. As suggested by Forbes (1960: 21), the distribution of *harrisii* probably coincides with that of its foodplant, which is found in south-eastern Canada, the eastern half of the United States (except for Florida and the Gulf coast) and in parts of north-eastern Mexico (McAlpine & Applefield, 1973).

Halysidota meridionalis Rothschild, **nom. rev., stat. n.**

(Fig. 5)

Halisidota tessellaris meridionalis Rothschild, 1909: 286. LECTOTYPE ♂, MEXICO (BMNH), here designated [examined].

Halisidota tessellaris meridionalis Rothschild; [Rothschild], 1911: pl. 11, figs 34 [lectotype], 35 (good colour-plate).

DIAGNOSIS. ♂ and ♀. Forewing: ♂, 28–31 mm; ♀, 29–31 mm. In Mexico the only species likely to be confused with *meridionalis* is *schausi*, but the latter has a black or partly black clypeofrons, well-marked green margins to the tegulae, an anally dilated medial fascia in most specimens, the fasciae noticeably yellow at the costa, and distinctive male genitalia. (See *tessellaris* for differences between it and *meridionalis*.)

STATUS. Strand (1919: 85) listed *meridionalis* as a 'var.' of *tessellaris* and Travassos (1963: 476) placed *meridionalis* in the synonymy of *tessellaris*. Although the male genitalia of *meridionalis* and *tessellaris* are probably indistinguishable from each other, the difference in size and colour-pattern indicates specific distinctness. Further evidence of the probable specific distinctness of *meridionalis* is provided by a possibly sympatric male (in BMNH) of *tessellaris* labelled 'Mexico', unfortunately without further locality data.

TYPE-MATERIAL. Rothschild (1909: 286) listed three male and two female syntypes from 'Orizaba, Mexico, February 1896' collected by W. Schaus. Only two specimens with precisely these data were present in the Rothschild collection when it was transferred to London: one male and one female. Two other males bear the same data as the latter except for the month of collection which is given as March and April respectively. A second female from the type-locality, collected by Schaus in May, 1896, completes the supposed syntypic series and bears a label in Rothschild's handwriting '*Halisidota tessellaris meridionalis* Rothschild Type'. Technically this so-called type, together with the two males collected in March and April, are not syntypes because their data labels differ in content from the collection data given in the original description, although the likelihood is that Rothschild failed to realize that his original eight specimens were collected in different months of 1896 and mistakenly listed them all as having been collected in February. The male of the pair of specimens whose data do agree with those given by Rothschild (1909: 286) is chosen, therefore, as the lectotype.

DISTRIBUTION. Mexico.

MATERIAL EXAMINED

Halisidota tessellaris meridionalis Rothschild, lectotype ♂, **Mexico:** Orizaba, ii.1896 (*W. Schaus*) (BMNH). **Mexico**: 1 ♀, S.L.P. [San Luis Potosi], Tamazunchale (AMNH); 1 ♀, S.L.P., El Naranjo (El Salto) [23 47′N 105°22′W] (USNM); 1 ♀, Puebla, Finca San Juan Apulco, near Zacapoaxtla, ix.1971 (LACM); 1 ♂, Vera Cruz, N. Chocoman, vii.1966 (USNM); 1 ♂, 5 ♀ [Vera Cruz], Misantla, vii–ix, 1911 & 1914 (BMNH); 1 ♂, 2 ♀, Vera Cruz, Orizaba, vii, viii.1913 (AMNH); 2 ♂, 2 ♀, [Vera Cruz,] Orizaba, i–v.1896 (including ♀ paralectotype) (BMNH); 1 ♂, [Vera Cruz,] Jalapa (AMNH); 1 ♂, [Vera Cruz,] Jalapa, 30.iv.1913 (ZSBS); 1 ♀, 'Mexico' (AMNH).

Halysidota insularis Rothschild **nom. rev., stat. n.**

(Figs 6, 52)

Halisidota schausi insularis Rothschild, 1909: 285. Holotye ♂, WINDWARD ISLANDS: St Lucia (BMNH) [examined].

Halisidota cinctipes insularis Rothschild; [Rothschild], 1911: pl. 11, figs 32 and 33 [poor figs].

DIAGNOSIS. ♂ and ♀. Forewing: ♂, 23–24 mm; ♀, 24–25 mm. Fully marked specimens of *insularis* closely resemble darkly marked Floridan specimens of *tessellaris* in overall intensity of the coloration (see Fig. 6), but some have abbreviated basal, antemedial, medial and postmedial markings, and all *insularis* specimens differ in having a partly black clypeofrons and black scales on the basal segment of the palp. The longest antennal pectination is about twice the diameter of the antennal shaft at that point – half the length of *tessellaris* pectination. The tymbal organ has fewer microtymbals (14 to 15) than in *tessellaris*. The male genitalia are identical to those of *tessellaris* except for the partly spinose vesica (see Fig. 52).

STATUS. Travassos (1963: 476) placed *insularis* incorrectly in the synonymy of *tessellaris*; the name is here removed from synonymy.

DISTRIBUTION. Known only from St Lucia.

MATERIAL EXAMINED

Halisidota schausi insularis Rothschild, holotype ♂, **Windward Islands**: St Lucia, iv.1890, bred (BMNH). **Windward Islands**: 10 ♂, 8 ♀ (including 6 ♂, 7 ♀ paratypes), St Lucia, i–vi.1902–1903 (BMNH, 1 ♂ USNM); 1 ♂, St Lucia, 1 mile [1.6 km] NW. of Soufrière, 18–23.xi.1975 (USNM); 3 ♂, St Lucia, 2 miles [3.2 km] S. of Anse la Raye, 16–19.iv.1972 (LACM); 1 ♂, 1 ♀, St Lucia, Barre de l'Isle, 22.xii.1975 (Toulgoët Coll.).

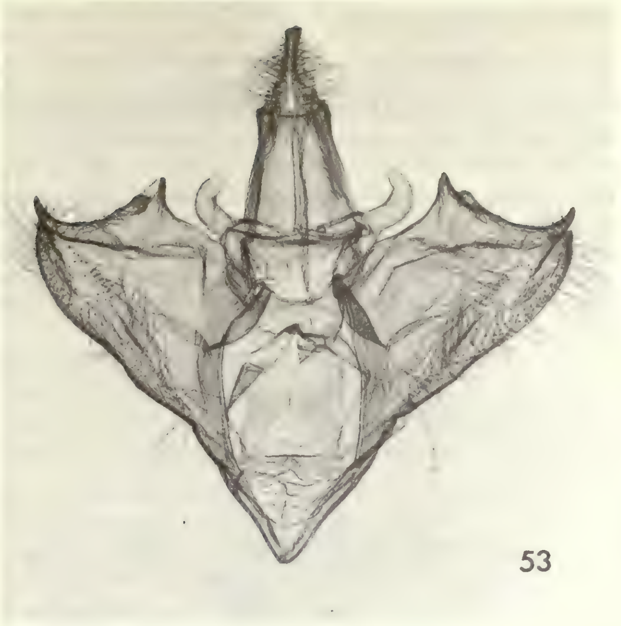
Halysidota ruscheweyhi Dyar **nom. rev., stat. n.**

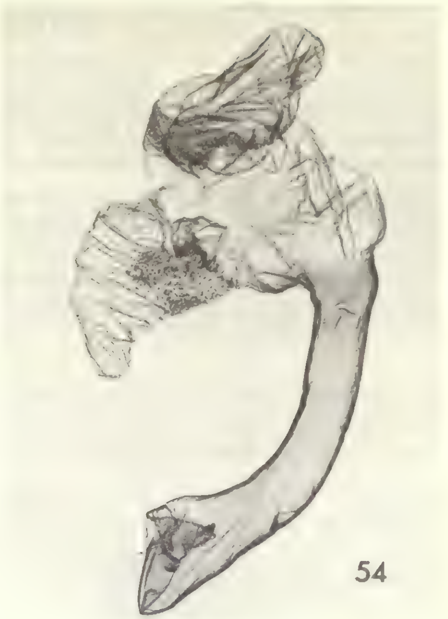
(Figs 11, 53, 54)

Halisidota schausi ruscheweyhi Dyar, 1912: 52. Lectotype ♂, ARGENTINA (BMNH) [examined].

Halisidota schausi ruscheweyhi Dyar; Watson, 1971: 83, pls 63c & 194c,d [lectotype designation].

DESCRIPTION. ♂ and ♀. Forewing: ♂, 24–26 mm; ♀, 26–28 mm. Clypeofrons greyish brown, becoming paler towards labrum; dorsal third of clypeofrons and whole of vertex light greyish yellow, slightly bluish green dorsally. Palp greyish yellow; basal and second segment each with black-edged orange-yellow spot. Antenna yellow at base, remainder greyish yellow. Longest antennal pectination (♂) slightly less than three times diameter of shaft at that point. Patagia greyish yellow edged posteriorly with bluish green posterior margin. Tegula greyish yellow, usually with longitudinal black line in middle; fringed medially with bluish green. Rest of thorax dull orange-yellow dorsally, with bluish green mid-dorsal line; greyish yellow laterally and ventrally except for brown area ventral and lateral to eyes. Microtymbal number: 17 to 18. Outer surface of legs orange-yellow, inner surface pale yellow; markings pale yellow edged with black. Forewing pale greyish yellow dorsally; markings slightly darker, edged with black then white costally and elsewhere





Figs 53, 54 *Halysidota ruscheweyhi* ♂ genitalia, slide 2226, Argentina.

proximal to discocellular marking. Dorsal surface of hindwing yellow-white, more strongly yellowish anally; brown apical mark present in two specimens examined. Ventral surface of wings yellowish white, forewing darker; markings of forewing poorly defined except at costa. Abdomen dull orange-yellow dorsally, pale greyish yellow ventrally; trace of brown lateral spots in some specimens.

♂ genitalia. Apical costal process of valve extends distal to apical process of sacculus; non-setose costal process of valve moderately well developed; vincular lobes about three times width at middle; lobes of tegumen spinose, poorly developed; uncus slender. Anterior lobe of vesica conspicuously spinose; longest spine 2.5 times its basal diameter.

REMARKS. Unlikely to be confused externally with any other species of the *tessellaris*-group found in Argentina or Paraguay (*steinbachi, nigrilinea, tucumanicola* and *brasiliensis*), which have differently patterned wings, or with any other species of its group.

STATUS. *H. ruscheweyhi* is here removed from the synonymy of *tessellaris* in which it was placed by Travassos (1963: 477).

LARVA. [The BMNH possesses a single blown larva collected by Schimpf which was placed in the pre-1915 collection series of *ruscheweyhi* and is provisionally accepted as a specimen of this species.] Hair-tufts of mesothorax mostly long, brownish yellow, with some brown setae and with single white dorsolateral hair tuft on each side. Vestiture of metathorax somewhat damaged but probably similar to that of mesothorax except for the absence of white dorsolateral setae. Segments 1 to 8 of abdomen have dark brown dorsal 'tooth-brush' tufts; long white setae, more numerous on posterior segments, on segments 2 to 9 immediately ventral to spiracle; and longer white setae arise from verruca immediately dorsal to spiracle on segment 8.

DISTRIBUTION. Argentina and Paraguay.

MATERIAL EXAMINED

Halisidota schausi ruscheweyhi Dyar, lectotype ♂, **Argentina**: Buenos Aires (USNM).

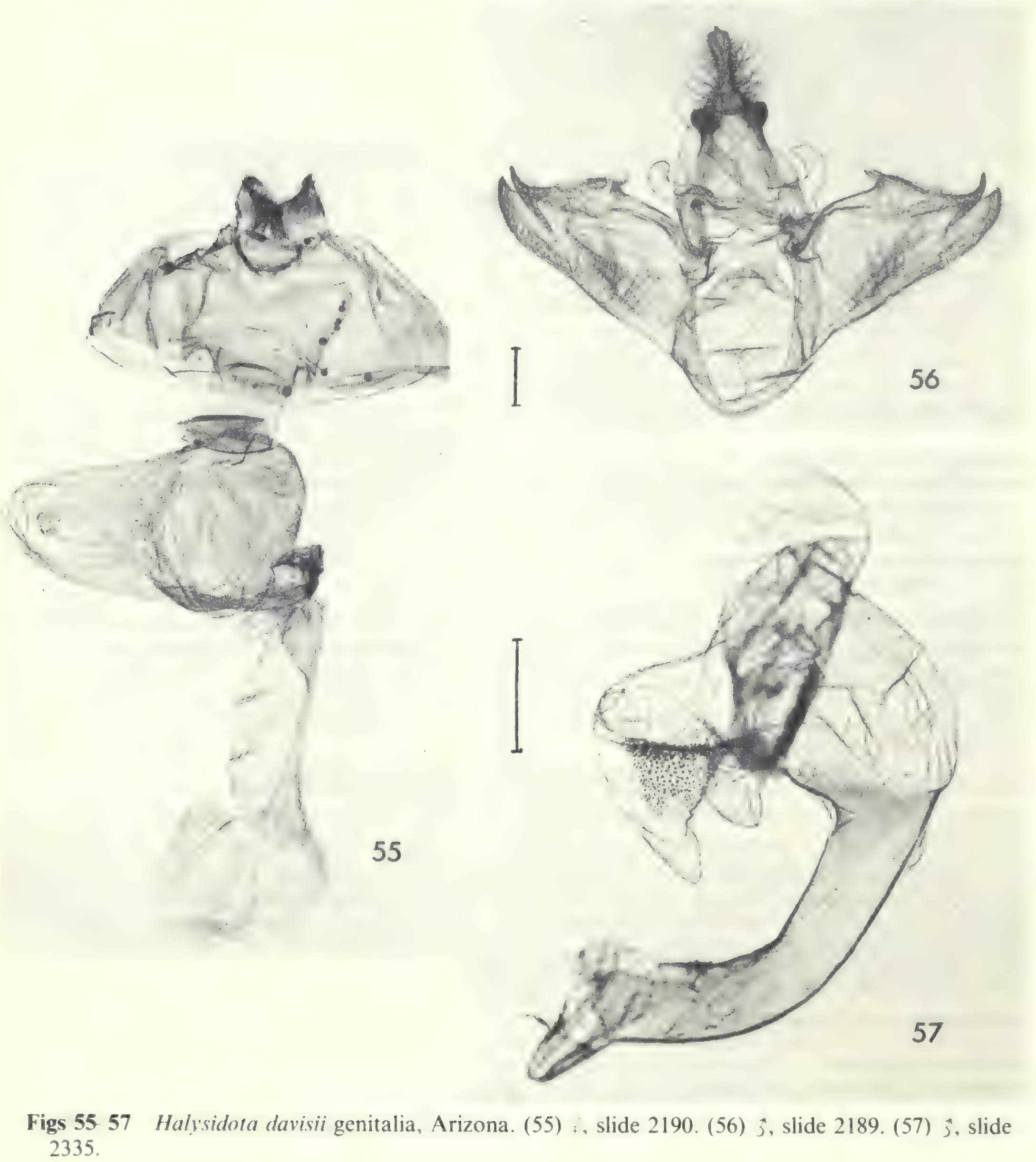
Argentina: 3 ♀, Buenos Aires (USNM): 4 ♂, 4 ♀, Buenos Aires (BMNH); 1 ♂, Buenos Aires state, Platenus, 11.xi (AMNH); 1 ♂, 1 ♀ Tucuman (BMNH). **Paraguay**: 1 ♀ (USNM).

Halysidota davisii Edwards **sp. rev.**

(Figs 12, 13, 55–57)

Halesidota davisii Edwards, 1875: 365. LECTOTYPE ♂, U.S.A. (AMNH), here designated [examined].
Halisidota cinctipes var. *davisii* Edwards; Strand, 1919: 73.
Halisidota cinctipes ab. *davisii* Edwards; Seitz, 1922: 412 [poor fig.].

DESCRIPTION. ♂ and ♀. Forewing: ♂, 24–29 mm; ♀, 26–32 mm. Basal and second segment of palp orange-yellow, usually with some black scales; apical segment black, black with white scales, or orange-yellow marked with brown or black. Clypeofrons pale yellow with varying amount of black, or entirely black. Vertex of head pale yellow; distal part of some scales between base of antennae greyish blue-green. Scape, pedicel and basal few segments of antennae orange-yellow; longest antennal pectination (♂) about 2·5 times



Figs 55–57 *Halysidota davisii* genitalia, Arizona. (55) ♀, slide 2190. (56) ♂, slide 2189. (57) ♂, slide 2335.

diameter of shaft at that point. Patagia pale yellow, edged posteromedially with greyish blue-green; tegulae pale yellow, fringed laterally with orange-yellow and medially with greyish blue-green, and with anteromedial black spot or streak in most specimens; rest of thorax orange-yellow with longitudinal greyish blue-green line mid-dorsally. Outer surface of legs orange-yellow, inner surface pale yellow; markings black or, usually, white edged with black. Microtymbal number: 17–18. Forewing pale yellow above; fasciae greyish yellow edged with black, more yellowish costally and at distal end of cell. Basal and antemedial fasciae and postmedial markings abbreviated in some specimens but always present; medial and subterminal fasciae much reduced, absent, or (rarely) well developed; terminal fascia poorly developed except at apex in most specimens, or (rarely) absent or well developed. Under surface of forewing similar to upper surface but more sparsely scaled and fasciae less well defined. Hindwing pale yellow, sparsely scaled except anally; rarely with brown apical marking. Abdomen orange-yellow dorsally, pale yellow laterally and ventrally; each segment with small black dot or streak ventral to spiracle.

♂ genitalia indistinguishable from those of *schausi*. The shape of the uncus and tegumen lobes varies individually to a limited extent.

Diagnosis. The only sympatric species likely to be confused with *davisii* is *schausi*, but the fasciae of *davisii* are generally more heavily marked (though narrower and more abbreviated, especially the subterminal fascia) and the ground-colour of the wings noticeably more opaque.

Variation. Specimens collected in Yavapai County, Arizona (Fig. 13) are generally more heavily marked than those examined from elsewhere in the United States or from Mexico. Specimens with the forewing fasciae reduced to much abbreviated basal, sub-basal and postmedial markings occur in Texas (Alpine, Kerrville, Fort Davis) and southern Arizona (Fig. 12).

Status. Travassos (1963: 475) apparently intended to place *davisii* in the synonymy of *tessellaris* but did not list *davisii* together with its correct authorship. Seitz's (1922: 412) incorrect relegation of *davisii* to infrasubspecific rank has not been accepted by most subsequent authors.

Foodplant. *H. davisii* is not listed by Tietz (1972) whose literature coverage was complete up to 1950 (Ferguson, 1973) and no reference to the foodplant of this species has been found in works published since 1950.

Distribution. Specimens have been examined from the states of Utah, Arizona, New Mexico and from north-western Texas. The few Mexican specimens examined were collected in north-western Mexico, three from localities at 6,600 ft [2010 m] or 6,700 ft [2040 m].

Material examined

Halesidota davisii Edwards, lectotype ♂, **U.S.A.**: Arizona [Prescott] (AMNH). (Edwards did not specify how many specimens were included in the original material of this species. The specimen designated as lectotype bears the labels 'Arizona; 5716 Arizona; Type No. AMNH No. 7967 collection Hy Edwards; Halesidota daviesi Hy Ed. Type'.)

U.S.A.: 1 ♂, Utah, Eureka, 4.x.1927 (LACM); 1 ♀, Arizona, Coconino County, 7 miles [11.2 km] W. of Williams, 8–15.viii.1956 (LACM); 15 ♂, 14 ♀, A., Yavapai County, Prescott, 5300 ft [1610 m], 9.vii.–6.viii.1970–1972 (LACM, BMNH); 1 ♂, A., Yavapai County, vii.1910 (CM); 2 ♀, A., Yavapai County, Seligman, 16.vii.1956, 18.viii.1960 (LACM); 14 ♂, 18 ♀, A., Santa Rita Mts, Madera Canyon, 5000 ft [1520 m], 8.vii.–4.ix.1947–1971 (LACM, BM); 1 ♂, A., Pima County, Santa Rita Mts, Box Canyon, 20.vi.1959 (LACM); 2 ♂, 2 ♀, A., Santa Cruz County, Oro Blanco Mts, 1 mile [1.6 km] S. of Pena Blanca Lake, 4000 ft [1220 m], 19.viii.1971 (BMNH); 1 ♂, A., Oro Blanco Mts, Pena Blanca Lake, 10 miles WNW. of Nogales, 3700 ft [1130 m], 25.vii.1971 (LACM); 6 ♂, 2 ♀, A., Oro Blanco Mts, Pena Blanca Canyon, 2.viii.1960 (LACM); 5 ♂, A., Santa Cruz Co., Nogales, 22.vii.–13.viii, 1957–1958 (1 ♂ in PAS, rest in LACM); 1 ♂, A., 4 miles [6.4 km] N. of Nogales, 13.viii.1955 (LACM); 1 ♂, A., Santa Cruz Co., Patagonia Mts, Washington Camp, 26.v.1972 (AMNH); 1 ♀, A., Santa Cruz Co., Baboquivari Mts, Brown Canyon, 28.vii.1959 (LACM); 2 ♂, 1 ♀, A., Cochise County, Chiracahua Mts, S.W. Research Station, 5400 ft [1640 m] (USNM, LACM, AMNH); 1 ♂, A., Cochise C., 'Cave Cr Cyn', Stewart Camp, 5400 ft [1640 m], 31.vii.1972 (LACM); 2 ♂, 1 ♀, A., labelled 'Arizona' (USNM, BMNH); 1 ♂, New Mexico, Eddy County, Sitting Bull Falls, 42 miles [67.6 km] SW. of Carlsbad, 4800 ft [1460 m], 28.vi.1964 (AMNH); 1 ♀, N.M., Eddy Co., Guadelupe Mts, Guadelupe Canyon, 14.viii.1967 (LACM); 1 ♂, N.M., Hidalgo County, Granite Pass, 5.viii.1967 (LACM); 1 ♂, N.M., [Luna County,] Deming, 8.vii.1915 (LACM) (this specimen labelled 'Texas, N' in error); 1 ♂, 2 ♀, Texas. Jeff Davis County, Fort Davis, 24–30.vii.1964–1975 (LACM);

2 ♂, 4 ♀, T., Jeff Davis Co., Limpia Canyon, near Fort Davis, 4.v.–8.viii.1961–1974 (LACM); 1 ♂, T., Brewster County, Big Bend (USNM); 2 ♂, 3 ♀, T., Brewster Co., Chisos Mts, Big Bend National Park, Green Gulch, 16–27.viii.1964–1969 (LACM, AMNH, Toulgoët); 2 ♂, T., Brewster Co., Chisos Mts, Big Bend National Park, Big Bend Basin, 6.v.–25.viii.1964–1965 (LACM); 2 ♂, 4 ♀, T., Brewster Co., Alpine, 1–2.vi.–7.viii.1925 (BMNH, LACM); 3 ♂, T., [Kerr County,] Kerrville, viii–ix.1901–1904 (LACM). **Mexico**: 1 ♀, Chihuahua, 16 road miles [25.7 km] SW. of Colonia Juarez, 6600 ft [2010 m], 18.viii.1976 (LACM); 2 ♂, Sinaloa, 1·1 road miles [1·7 km] W. of El Palmito, 6700 ft [2040 m], 26.viii.1976 (LACM); 1 ♂, Sinaloa, 44 miles [70·7 km] E. of Villa Union, 27.viii.1960 (LACM).

Halysidota schausi Rothschild **sp. rev.**

(Figs 7–10)

Halisidota schausi Rothschild, 1909: 284. Lectotype ♂, Colombia (BMNH) [examined].
Halisidota schausi Rothschild; [Rothschild], 1911: pl. 11, figs 21, 22 [fig. 21 probably represents lectotype].
Halisidota schausi Rothschild; Hampson, 1920: 286 [lectotype designation].
Halisidota schausi pallida Rothschild, 1909: 285. Lectotype ♂, Mexico (BMNH) [examined]. [A junior secondary homonym of *Phaegoptera pallida* Schaus, 1901: 267.]
Halisidota schausi pallida Rothschild; [Rothschild], 1911, pl. 11, figs 14, 15.
Halisidota schausi pallida Rothschild; Hampson, 1920: 286 [lectotype designation].
Halisidota schausi v. *mexiconis* Strand, 1919: 416. [Replacement name for *pallida*.] **Syn. n.**

Description. ♂ and ♀. Forewing: ♂, 21–32 mm; ♀, 25–33 mm. Clypeofrons pale yellow or brownish yellow ventrally, black or brown dorsally (this dark area restricted to a narrow transverse band in some specimens but extending over most of clypeofrons in others); vertex of head pale yellow; suffused with greenish blue in some specimens. Basal segment of palp orange-yellow with varying degree of black or black and greyish white scaling proximally; second segment orange-yellow, with black or black and greyish white scales proximally and distally; apical segment black, or black and greyish white. Antennae orange-yellow dorsally; largest antennal pectination (♂) 2·5 times diameter of antennal shaft at that point. Patagia pale yellow, fringed posteriorly with greenish blue. Tegulae pale yellow, each with black longitudinal stripe and fringed posteriorly and medially with greenish blue. Rest of thorax orange-yellow, except for brown patch posterior to eye and at anterolateral corner of tegula and greenish blue dorsal line. Legs yellow, with brown- or black-edged pale yellow markings. Microtymbal number: 10 or 11. Forewing pale yellow above; black-edged markings yellowish brown, except for discocellular marking and costal part of all fasciae except terminal which are orange-yellow; under surface paler, more greyish. Hindwing yellowish white, becoming more yellowish anally; small dark apical marking present in few specimens. Abdomen orange-yellow dorsally, pale yellow laterally and ventrally; black posterolateral spot present on each side of segments 3 to 8 (♂) or 3 to 6 (♀).

♂ genitalia. Apical costal processes of valve extend distal to apical process of sacculus; non-setose mid-costal process moderately well developed, its posterior margin continuous with distal part of costal margin of valve; vincular lobes about three times least width; lobes of tegumen strongly developed and densely setose; uncus dilated before apex or parallel-sided. Tapered anteroventral lobe of vesica spinose dorsally, with small accessory lobe at ventral angle and larger, basally scobinate lobe arising from the spinose area.

Diagnosis. In North America, *schausi* could be confused only with well-marked *davisii*, but the ground-colour of the wings of *schausi* is much less opaque and the markings paler but more distinctly yellow than in *davisii*. (The male genitalia are apparently indistinguishable from those of *davisii*.) The South American *yapacaniae, brasiliensis* and *tucumanicola* could be mistaken externally for *schausi* but are not known to be sympatric with *schausi* and have readily distinguishable male genitalia.

Rio Grande form. Forewing: ♂, 24–27 mm; ♀, 25–28 mm. A batch of 32 specimens from the United States' side of the lower Rio Grande Valley, and four from neighbouring areas of Mexico are tentatively identified as specimens of *schausi*. These Texan and Mexican specimens are uniformly darker than normal *schausi*, having a more brownish ground-colour and more greyish fasciae, but no differences in the genitalia have been found. Along the Rio Grande they may represent a local isolate, restricted to an area of lush vegetation surrounded by desert scrub which extends along the river valley from near the town of Mission to the coast (Porter, 1977). Normal *schausi* have been examined from further north in Texas (Harris Co.).

INDIVIDUAL VARIATION. This is particularly evident on the forewing where the subterminal fascia may be reduced to unconnected spots in a few specimens (Fig. 9) and the antemedial fascia interrupted in the cell or absent anterior to the cell as in one Texan specimen. Specimens also vary in the extent to which the fasciae are edged with black or dark brown and in the general coloration of the fasciae.

STATUS. Travassos (1963: 476) wrongly synonymized *schausi* and *pallida* with *tessellaris*. Both *pallida* and *schausi* were described by Rothschild in the same paper, the former as the Mexican subspecies of *schausi*. Rothschild's original series of *pallida* from two Mexican localities comprised specimens which were either worn, or were slightly paler and less well marked than typical Mexican *schausi* (as in the occasional specimen from South America). *H. pallida*, and its replacement name, *mexiconis*, must therefore be placed in the synonymy of *schausi*.

None of the other four so-called subspecies of *schausi* described by Rothschild (1909: 285) (*insularis, tucumana* [now *tucumanicola* Strand], *meridensis* and *brasiliensis*) is now recognized as such.

Strand (1919: 416) replaced the name *pallida* Rothschild, 1909, which is preoccupied by *Halisidota pallida* Schaus (1901: 267), by *Halisidota schausi* v. *mexiconis*.

AFFINITIES. See *yapacania* and *brasiliensis*, which are possible vicariants of *schausi*.

FOODPLANTS. Silva *et al.* (1968: 217) list *Cestrum nocturnum* (Solanaceae) as a foodplant of the larva. An adult specimen in the USNM is labelled 'on Hackberry' (*Celtis*, Ulmaceae).

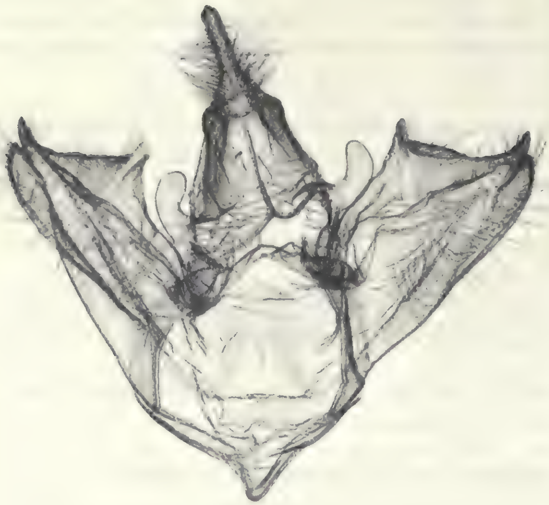
DISTRIBUTION. The range of *schausi* extends from Texas through Mexico and Central America (but not the Antilles) to Colombia, Venezuela, Ecuador and Peru.

MATERIAL EXAMINED

Halisidota schausi Rothschild, lectotype ♂, **Colombia**: Popayan (BMNH). *Halisidota schausi pallida* Rothschild, lectotype ♂, **Mexico**: Cuernavaca (BMNH).

Rio Grande form. **U.S.A.**: 22 ♂, 5 ♀, Texas, Cameron County, Brownsville, 24.ii.–10.iii. 1925, 1967 (AMNH, BMNH, TAM, USNM); 1 ♀, T., Brownsville, Southmost, Palm Grove Sanct[uary], 3–6.v.1975 (LACM); 2 ♀, T., Hidalgo County, Weslaco, 18–21.iii.1953 (TAM); 1 ♂, 1 ♀, T., Hidalgo County, Mercedes, 3.ix.1958, 1969 (AMNH). **Mexico**: 1 ♀, SLP (San Luis Potosi), El Salto Falls (AMNH); 1 ♂, San Luis Potosi, 2 miles [3·2 km] SW. of Tamazunchale, San Isidro (AMNH); 1 ♂, NL [Nuevo Leon], 2 miles [3·2 km] S. of Monterrey, Chipinque Mesa, 4200 ft [1150 m], 10.viii.1963 (USNM); 1 ♂, NL [Nuevo Leon], 3 miles [4·8 km] E. of Galeana, 5000 ft [1500 m], 7–9.viii.1963 (USNM).

Pale (normal) form. **U.S.A.**: 1 ♂, Texas (USNM); 1 ♂, T., Harris County (CM); 1 ♂, 1 ♀, 'Texas' (NAS). **Mexico**: numerous specimens from the following states have been examined; San Luis Potosi, Queretaro, Hidalgo, Vera Cruz, Puebla, Morelos (including 1 ♂ paralectotype of *Halysidota instabilis* Dyar), Sinaloa, Jalisco, Michoacan, Guerrero, Oaxaca and Chiapas (BMNH, LACM, USNM, AMNH, ZSBS, TAM, AM, NAS, Toulgoët). **Guatemala**: 1 ♂, 3 ♀, Guatemala City (BMNH); 1 ♀, Chejel (BMNH); 1 ♂, 1 ♀ Huehuetenango, c. 1000 m (BMNH); 100 ex., Depto Zacapa, La Union, viii.–xi.1972 (LACM); 1 ♀, Municipio Coban, Chajsel, 1400 m, i.1973 (LACM); 2 ♂, 1 ♀ 'Gautemala' (MNHB). **Honduras**: 2 ♂, Cortes, Lago Yojoa, 18 km NE. of El Mochito, 20–21.viii.1974 (LACM). **Nicaragua**: 15 ♂, 8 ♀, Managua State, Las Nubes, 1300 ft [400 m], 21–26.x.1971 (LACM). **Costa Rica**: 3 ♂, 7 ♀ (BMNH); 3 ♀, Candalaria Mts (BMNH); 3 ♂, 1 ♀, San José, vi.1937 (BMNH, LACM, MNHN); 1 ♂, San José Province, 14 km N. of San Isidro del General, Pan. Am. Highway, 1600 m, 20–23.vi.1974 (BMNH); 3 ♂, 1 ♀, Punterenas Province, Monteverde, 1400 m, 27.ii.–16.vi.1972, 1974 (LACM, BMNH); 1 ♀, Turrialba (LACM); 1 ♀, 'Costa Rica' (MNHN). **Colombia**: 10 ♂, Cundinamarca Province, Monterredondo, 1420 m (ZSBS); 1 ♂, Upper Rio Negro, 800 m (BMNH); 1 ♀, near Cali, 5.x.1969 (Toulgoët). **Venezuela**: 1 ♂, 1 ♀, Arugua, Rancho Grande, near Maracay, 1100 m, 12.vii.–16.viii.1976 (BMNH, LACM); 3 ♂, 6 ♀, Caracas (BMNH); 1 ♀, Valencia (BMNH); 1 ♀, La Victoria, 1700 m, 8.vii.1963 (ZSBS); 1 ♀ La Puerta (UCV); 1 ♀, San Esteban, vi.1909 (BMNH); 1 ♀, Las Quigas, near San Esteban (BMNH); 1 ♂, Aroa (USNM); 14 ♂, 14 ♀, Mérida (BMNH, MNHN, USNM, ZSBS); 2 ♂, 6 ♀, 'Venezuela' (BMNH). **Ecuador**: 1 ♀, Guayaquil (USNM); 1 ♂, Tinalandia, near Santo Domingo, 700 m, 16.–19.vi.1977 (ZSBS); 1 ♀, Hazienda Piman, 2200 m, 2–4.vi.1977 (ZSBS). **Peru**: 2 ♂, 5 ♀, Lima (BMNH); 2 ♂, 1 ♀, Callao (BMNH); 1 ♂, Chanchamayo, La Merced (USNM).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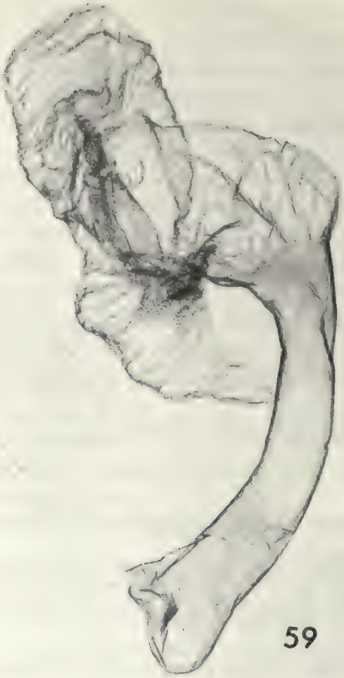
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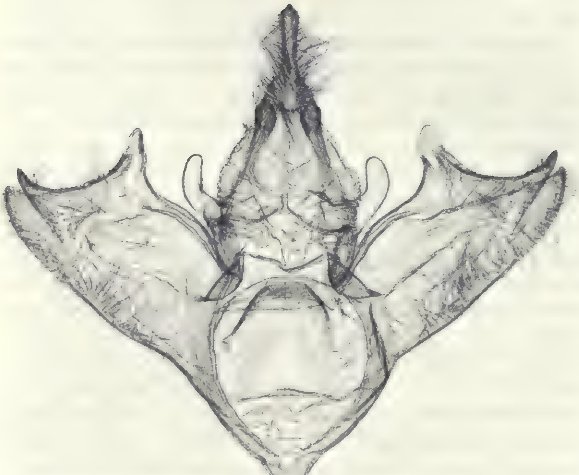
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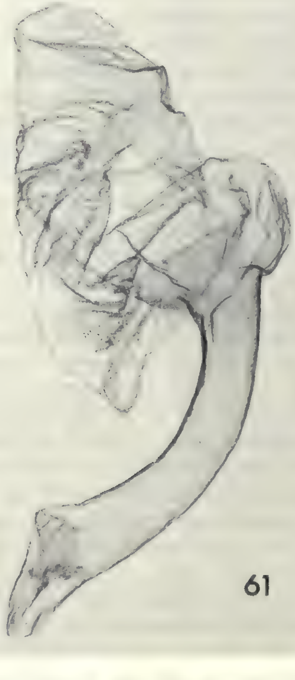
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Figs 58–61 *Halysidota* ♂ genitalia. (58, 59) *brasiliensis*, slide 2256, Brazil, São Paulo. (60, 61) *yapacaniae*, CM slide, Bolivia.

Halysidota brasiliensis Rothschild **nom. rev., stat. n.**

(Figs 14, 58, 59)

Halisidota schausi brasiliensis Rothschild, 1909: 285. Holotype ♀, BRAZIL (BMNH) [examined].
Halisidota schausi brasiliensis Rothschild, [Rothschild], 1911: pl. 11, fig. 5 [good fig. of worn type].

DIAGNOSIS. ♂ and ♀. Forewing: ♂, 27–29 mm; ♀, 28–32 mm. Similar in external characters of the head and appendages, thorax, legs and abdomen to *schausi*, but the yellow coloration is darker and more orange in tone. On the upper surface of forewing, the ground-colour is similarly darker than in well-marked *schausi*, the dark edges of the fasciae are accentuated by the noticeably paler ground-colour of the wing immediately adjacent to the fasciae, and the yellow costal parts of the fasciae are a more brownish yellow. The male genitalia differ from those of *schausi* in the shape of the mid-costal non-setose lobe of the valve, the smaller weakly spinose lobes of the tegumen and in the smaller accessory lobe on the left-hand side of the tapered anterior lobe of the vesica.

The Brazilian *pearsoni* is similar in size, but has dark costal markings on the forewing and in the male genitalia has shorter vincular lobes and distinctively shaped valves (see Figs 17, 64, 65).

Argentinian specimens of *brasiliensis* are probably not distinguishable externally from *tucumanicola* but can be separated in the male by the relative lengths of the apical processes of the valve (see Fig. 58).

STATUS. Travassos (1963: 476) wrongly placed *brasiliensis* in the synonymy of *tessellaris* from where it is here removed.

AFFINITIES. The external and male genitalic differences between *brasiliensis* and *schausi* militate against the possibility of a subspecific relationship, but allopatry and the overall similarity of these two species suggest that one may be a vicariant of the other although I can find no supporting synapomorphies.

FOODPLANT. Silva *et al.* (1968: 217) list *Phrygilanthus acutifolius* (Loranthaceae) and d'Almeida (1929) cites *Trema micrantha* (Ulmaceae).

DISTRIBUTION. The few available specimens examined were collected in south-eastern Brazil and adjacent Paraguay. A male specimen in the BMNH anomalously labelled 'La Rioja, Tucuman, Argentine' (both La Rioja and Tucuman are states of Argentina) plus 5 ♂ and 10 ♀ from Tucuman have not been listed below; they differ from the other material examined in the slightly larger spines on the anterior lobe of the vesica, and may represent a distinct subspecies (1 ♂ and 1 ♀ are paralectotypes of *tucumanicola*).

MATERIAL EXAMINED

Halisidota schausi brasiliensis Rothschild, holotype ♀, **Brazil**: Paraná, Castro (BMNH).

Brazil: 1 ♂, Bahia (BMNH); 2 ♂, São Paulo (BMNH); 1 ♀, Paraná, Castro, ix.1933 (BMNH); 1 ♂, 1 ♀, [Paraná,] Ponta Grossa, ix.1958 (UFP); 1 ♀, [Rio de Janeiro,] Corcovado Forest, 1958 (BMNH); 1 ♀, [Rio Grande do Sul,] Nova Teutonia [27°03′S, 52°24′W] (AMNH). **Paraguay**: 3 ♂, 2 ♀, Villarrica, iii.–xi.1922 (USNM, BMNH); 1 ♀, central; 1 ♀, 'Paraguay'.

Halysidota yapacaniae **sp. n.**

(Figs 15, 60, 61)

DESCRIPTION. ♂. Forewing: ♂, 27–29 mm. In coloration and colour-pattern probably indistinguishable from fully marked specimens of *schausi*, but with shorter antennal pectinations (longest pectination, ♂, 1·5 times diameter of shaft at that point).

♂ genitalia. Spatulate non-setose mid-costal lobe strongly developed; valve apex as for *schausi*; vincular lobes three times as long as least width; lobes of tegumen only moderately developed, minutely and inconspicuously spinose; uncus dilated before acuminate uncus; vesica as for *schausi* but anterior lobe slightly shorter in specimens examined.

♀ not known.

AFFINITIES. Overall similarity suggests that *yapacaniae* is a derivative of *schausi*, which it replaces in the eastern Andes of Bolivia and further eastwards in Bolivia. Judging from the altitude at which the type and two of the paratypes were collected, they were probably captured at a point on the Yapacani River west of Santa Cruz. The remaining paratype is labelled 'Prov. del Sara, Bolivia, 450 m., J. Steinbach' but no province by that name exists and the town of Sara (20°17′S, 65°50°W) is the possible place of capture of this specimen.

DISTRIBUTION. Known only from Bolivia.

MATERIAL EXAMINED

Holotype ♂, **Bolivia**: E., R[io,] Yapacani, 600 m, ii.1915 (*J. Steinbach*) (CM).

Paratypes. **Bolivia**: 2 ♂, data as holotype (CM, BMNH); 1 ♂ Sara ('Prov. del Sara'), 450 m, viii.1914 (*J. Steinbach*) (CM).

Halysidota tucumanicola Strand **nom. rev., stat. n.**

(Figs 16, 62, 63)

Halisidota schausi tucumana Rothschild, 1909: 285. LECTOTYPE ♂, ARGENTINA (BMNH), here designated [examined]. [Primary junior homonym of *Halisidota tucumana* Rothschild, 1909: 280.]

Halisidota schausi tucumana Rothschild; [Rothschild], 1911: pl. 11, figs 16, 17 [fig. 16 probably represents the type; both figs are too dark].

Halisidota cinctipes v. *tucumanicola* Strand, 1919: 416. [Replacement name.]

DESCRIPTION. ♂ and ♀. Forewing: ♂, 26 mm; ♀, 27–30 mm. Clypeofrons brownish yellow ventrally, dark brown or black dorsally; vertex pale yellow, the tips of scales between and posterior to antennae tinged with greenish blue. Basal segment of palp yellow distally, black and greyish white at base; second segment black at distal margin, black and greyish white basally, yellow at middle; apical segment black with few greyish white scales. Antenna orange-yellow dorsally; largest antennal pectination (♂) between 2·5 and 3·0 times diameter of shaft at that point. Patagia pale yellowish brown, edged posteriorly and medially with greenish blue. Tegulae pale yellowish brown with greenish blue posterior and medial fringe and dark brown longitudinal streak in middle. Rest of thorax orange-yellow dorsally with greenish blue longitudinal mid-dorsal line, orange-yellow laterally except for brown area posterior to patagia and eyes, pale yellow ventrally. Legs yellow with black, brown and greyish white markings. Microtymbal number: 13. Forewing pale yellow above, palest adjacent to fasciae; fasciae yellowish brown except for yellow costal elements and yellow discocellular marking; veins dark brown in fasciate areas of wing; undersurface paler, more greyish. Hindwing yellowish white, more intensely yellowish anally and at outer margin; apex with small brown marking in most specimens examined. Abdomen orange-yellow dorsally, pale brownish yellow laterally and ventrally; black lateral dash or spot on segments 3 to 8 (♂) or 3 to 6 (♀).

♂ genitalia. Apex of sacculus extends distal to apical process of costa; non-setose mid-costal process short, contorted. Vincular lobes short, broader than long; lobes of tegumen poorly developed, spines just visible at ×32; uncus weakly dilated before acuminate apex. Anterior lobe of vesica with two accessory dorsal lobes and larger ventral lobe; this anterior region scobinate except for apex and right-hand side of ventral lobe and becoming spinose at base of ventral lobe; posterior lobe of vesica minutely scobinate.

DIAGNOSIS. Probably not distinguishable from Argentinian specimens of *brasiliensis* externally, but easily distinguished by the male genitalia. Similar also to well-marked specimens of *schausi* (not yet recorded from Argentina) but fasciae a darker greyish colour and inner margin of terminal fascia markings more strongly convex, and in the male genitalia the shape of the valve and the smaller lobes of the vinculum and tegumen are distinctive. The male genitalia are similar to those of *pearsoni* but in colour-pattern these two species are unlikely to be confused (see *pearsoni*). (The illustration in Seitz (1922: pl. 59 'tucumana') is reasonable except for the excessively dark veins.)

STATUS AND HOMONYMY. Travassos (1963: 476) wrongly placed *tucumanicola* (as *tucumana* Rothschild) in the synonymy of *tessellaris*, an error which is now corrected.

Halisidota tucumana Rothschild (1909: 280) has priority over *H. schausi tucumana* Rothschild (1909: 285) because the former was proposed as the name of a species and the latter as the name of a subspecies (Article 57e of the *Code*). Strand (1919: 416) replaced the junior homonym with *tucumanicola*.

FOODPLANTS. Hayward (1969: 13) listed *Celtis* spp., 'especially *Celtis spinosa*', and a *Trema* species (both Ulmaceae) as foodplants of *schausi*. *H. schausi* does not occur in Argentina and Hayward's comments could therefore refer to the similarly patterned *tucumanicola* or to *brasiliensis*.

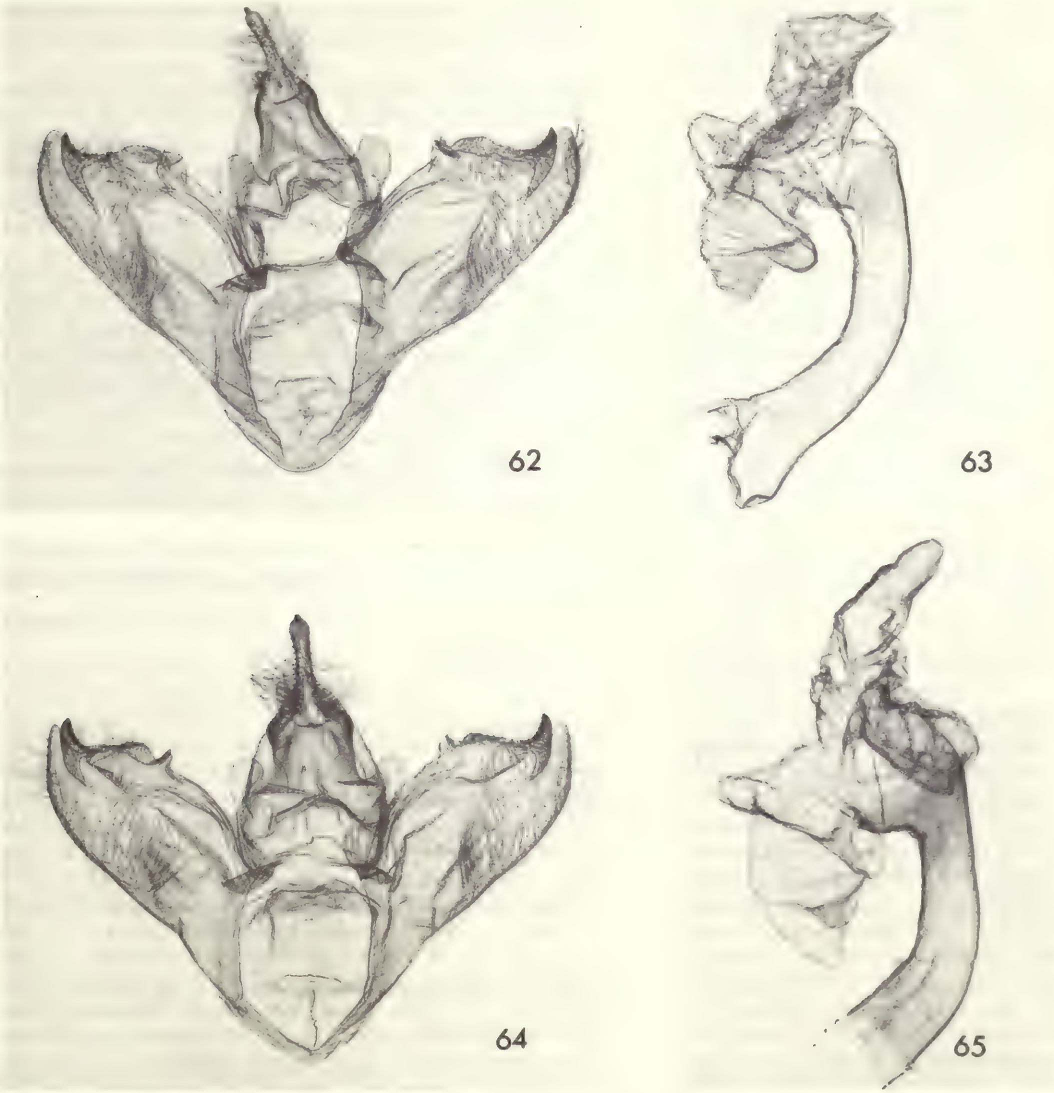
DISTRIBUTION. Argentina.

MATERIAL EXAMINED

Halisidota schausi tucumana Rothschild, lectotype ♂, **Argentina**: Tucumán, 1903 (*J. Steinbach*) (BMNH).

Argentina: 1 ♂, 2 ♀, Tucumán (BMNH) (including 2 ♀ paralectotypes); 10 ♂, Prov. Tucumán, Parque Sierra San Javier, Horco Molle, 700 m, 22, 24.xi.1973; 15.ii.1974 (LACM); 1 ♀, Prov. Tucumán, 28.xii.1950 (ZSBS); 1 ♂, 1 ♀, Prov. Jujuy, Yala, 1450 m, 20.ii.1955 (ZSBS); 1 ♀, Buenos Aires, Punta Lara, 12.xi.1951 (ZSBS).

Doubtfully identified material. **Argentina**: 8 ♀, Prov. Tucumán, Parque Sierra San Xavier, Horco Molle, 700 m, 24, 25.xi.1973 (LACM).



Figs 62–65 *Halysidota* ♂ genitalia. (62, 63) *tucumanicola*, slide 2194, Argentina. (64) *pearsoni* paratype, slide 2222, Brazil, Sta Catarina. (65) *pearsoni* paratype, UFP slide, Brazil, Sta Catarina.

Halysidota pearsoni sp. n.

(Figs 17, 64, 65)

Description. ♂ and ♀. Forewing: ♂, 27–31 mm; ♀, 30–33 mm. Clypeofrons entirely greyish brown, or greyish brown becoming greyish yellow ventrally; vertex of head yellowish brown tinged with bluish green. Palp clothed with black and greyish white scales; distal part of basal segment orange-yellow laterally; second segment with orange-yellow spot laterally. Antennal shaft yellow dorsally towards base, brown distally; longest antennal pectination (♂) three times diameter of antennal shaft at that point. Patagia yellowish grey but discocellular and costal markings more yellowish; under surface pale, more greyish. Hind greenish blue and with short brown longitudinal streak in middle; rest of thorax orange-yellow except for greenish blue dorsal line and greyish brown at anterolateral corner of tegula and in narrow band posterior to eye, palest ventrally. Legs orange-yellow on outer surface, pale yellow on inner surface; markings black and greyish white edged with black. Microtymbal number: 15. Forewing pale greyish yellow above; fasciae yellowish grey but discocellular and costal markings more yellowish; under surface pale, more greyish. Hind wing pale orange-yellow, most intensely coloured anally and at outer margin; small dark brown marking present at apex of wing in holotype and most specimens examined. Abdomen orange-yellow dorsally, pale greyish yellow ventrally; black lateral spot present on each side of segments 3–8 (♂) or 3 to 6 (♀).

♂ genitalia. Apical processes of each valve extending to about same distance from base of valve in opened position; setose costal process of valve prominent; vincular lobes short, either as broad as long or slightly longer than broad; lobes of tegumen poorly developed, spines just visible at × 32 magnification; uncus weakly dilated before apex. Anterior lobe of vesica scobinate except along ventral surface, with accessory lobe on left-hand side dorsally near apex and long, transverse, bilobate lobe near its base; this elongate lobe bearing short spines ventrolaterally; posterior lobe of vesica minutely scobinate.

Diagnosis. Externally most like the sympatric *brasiliensis*, but readily separable by the generally darker discocellular and costal markings on the forewing and by the usually narrower medial fascia. The genitalia are similar to those of *tucumanicola*, but the setose costal process of the valve is more prominent and the apical processes of about equal length. Distinguished from the more northerly *underwoodi* by the absence of dark scales on the veins crossing the subterminal and terminal fasciae on the upper surface of the forewing.

Affinities. Similarities in the male genitalia, particularly the similarly shaped lobes of the vesica, suggest a close relationship between this species and *tucumanicola*, but none of these character states can be accepted as apomorphic.

Derivation of name. Named after Mr H. R. Pearson, a good friend of the BMNH for many years.

Distribution. Brazil and possibly Paraguay (see below).

Material examined

Holotype ♂, **Brazil**: Santa Catarina, Jaragua do Sul (*F. H. Hoffman*) (BMNH).

Paratypes. **Brazil:** 13 ♂, 2 ♀, Santa Catarina, Jaragua do Sul, vii, viii, ix.1932, 1935 (BMNH); 3 ♂, Santa Catarina, Rio Vermelho, 830 m, vi, vii.1936, 28.ix.1973 (BMNH); 4 ♂, Santa Catarina, Hansa Humboldt, 60 m, vii.1936 (BMNH); 2 ♂, Santa Catarina, hills between Hansa [Humboldt] and Jaragua [do Sul], 400 m, vii.1935 (BMNH); 2 ♂, Santa Catarina, Bento do Sul, Rio Vermelho, 850 m, 24.viii.1973 (UFP); 1 ♂, Santa Catarina, Joinville, viii.1922 (USNM); 1 ♂, [Rio Grande do Sul,] Nova Teutonia, 27°11′S, 52°23′W (Toulgoët Coll.); 1 ♀, Paraná, Morretas, Marumbi, 500 m, 17.vii.1966 (UFP); 1 ♀, [Minas Gerais,] Uberaba (BMNH); 1 ♂ [Minas Gerais,] Campo Belo (USNM); 1 ♀, Paraná, Castro, 950 m (BMNH); 4 ♂, 2 ♀, Rio State, Magé, Guapi-mirim (Caneca Fina, Rio Sucavao), 160 m, 19.vi.–29.x.1960–1973 (BMNH); 1 ♀, Rio State, Angra dos Reis, 700 m, 1–2.xi.1951 (BMNH); 1 ♂, Rio State, Teresopolis, 13–22.iii.1958 (BMNH); 1 ♂, Rio State, Itatiaia, 900 m, 14.ix.1952 (BMNH); 1 ♀, Rio State, Teresopolis, Barreira, 400 m, 26–29.iv.1957 (BMNH); 1 ♀, Rio de Janeiro; 1 ♀, São Paulo, Faz[enda] da Pedra, Rio Tamandua, Ribeirao Beto (BMNH); 1 ♀, São Paulo (ZSBS); 1 ♂ Campinas, Goiás (Goyaz), i.1934 (BMNH); 2 ♂, Espirito Santo, Santa Teresa, 2.ii.1964 (UFP); 1 ♂, Pernambuco, Serra de Comonati (Communaty), 1.ii.1893 (BMNH).

Non-paratypic material. **Paraguay**: 3 ♂, Villarica, v, vii, x.1922, 1951 (AMNH, BMNH).

Halysidota steinbachi Rothschild **sp. rev.**

(Figs 18, 66, 67)

Halisidota steinbachi Rothschild, 1909: 283. LECTOTYPE ♂, ARGENTINA (BMNH), here designated [examined].
Halisidota steinbachi Rothschild; Rothschild, 1911: pl. 11, figs 25, 26 (fig. 25 is of lectotype).

DESCRIPTION. ♂ and ♀. Forewing: ♂, 25–27 mm; ♀, 22–28 mm. Ventral two-thirds of clypeofrons dark brown, becoming paler towards labrum; vertex and dorsal third of clypeofrons pale yellowish grey-brown. Proximal part of each segment of palp clothed with mixture of dark brown and light brown scales; distal parts of segments orange-yellow. Scape of antenna pale yellowish brown proximally, yellow distally; base of shaft yellow dorsally. Longest antennal pectination (♂) slightly less than twice diameter of shaft at that point. Patagia and tegulae pale yellowish grey-brown; tegulae fringed medially with bluish grey, laterally with yellow, and with central black longitudinal streak; remainder of thorax orange-yellow dorsally and laterally, with bluish grey mid-dorsal line, and brown area at anterolateral corner of each patagium; pale yellow ventrally except for small brown patch ventral to eye. Microtymbal number: 13 to 15. Outer surface of legs orange-yellow, inner surface pale yellowish grey-brown; markings pale grey edged with dark brown. Forewing thinly scaled above, pale brownish yellow, palest at costa; markings brownish grey except for costal part of fasciae and whole of discocellular markings which are greenish yellow; fasciae bordered with black, then greyish white. Under surface of forewing paler; medial, subterminal and terminal fasciae pale brownish grey becoming pale yellow at costa; discocellular marking brown, continuous with pale brownish yellow costal marking; basal and antemedial fasciae pale brownish yellow becoming brown at costa. Hindwing pale yellow with small brownish grey apical marking on both surfaces of wing. Abdomen brownish orange-yellow dorsally, pale yellow ventrally, with black lateral dash on segments 3 to 8 (♂) or 3 to 6 (♀).

♂ genitalia. Acuminate, arcuate, apical costal process of valve distinctly longer than apical process of sacculus. Non-setose process of costa prominent. Vincular lobes about 2·5 times as long as width at middle. Lobes of tegumen small; spines just visible at ×32. Lobes of vesica similar to those of *schausi*.

DIAGNOSIS. Distinguished externally from Argentinian *tucumanicola* and *brasiliensis* by the yellowish grey-brown colour of the vertex, patagia and tegulae and by the dull brownish ground-colour of the forewing. The Peruvian *conflua* is similar in coloration, not colour-pattern, but differs in the shape of the valve and tegumen in the male genitalia.

STATUS. Travassos (1963: 476) incorrectly placed *steinbachi* in the synonymy of *tessellaris*; it is here removed from synonymy as the valid name of a distinct species.

FOODPLANTS. Hayward (1969: 13) listed *Celtis spinosa*, other species of *Celtis* (Ulmaceae) and *Ruellia longifolia* (Acanthaceae) as foodplants.

DISTRIBUTION. Argentina, Bolivia and Brazil.

MATERIAL EXAMINED

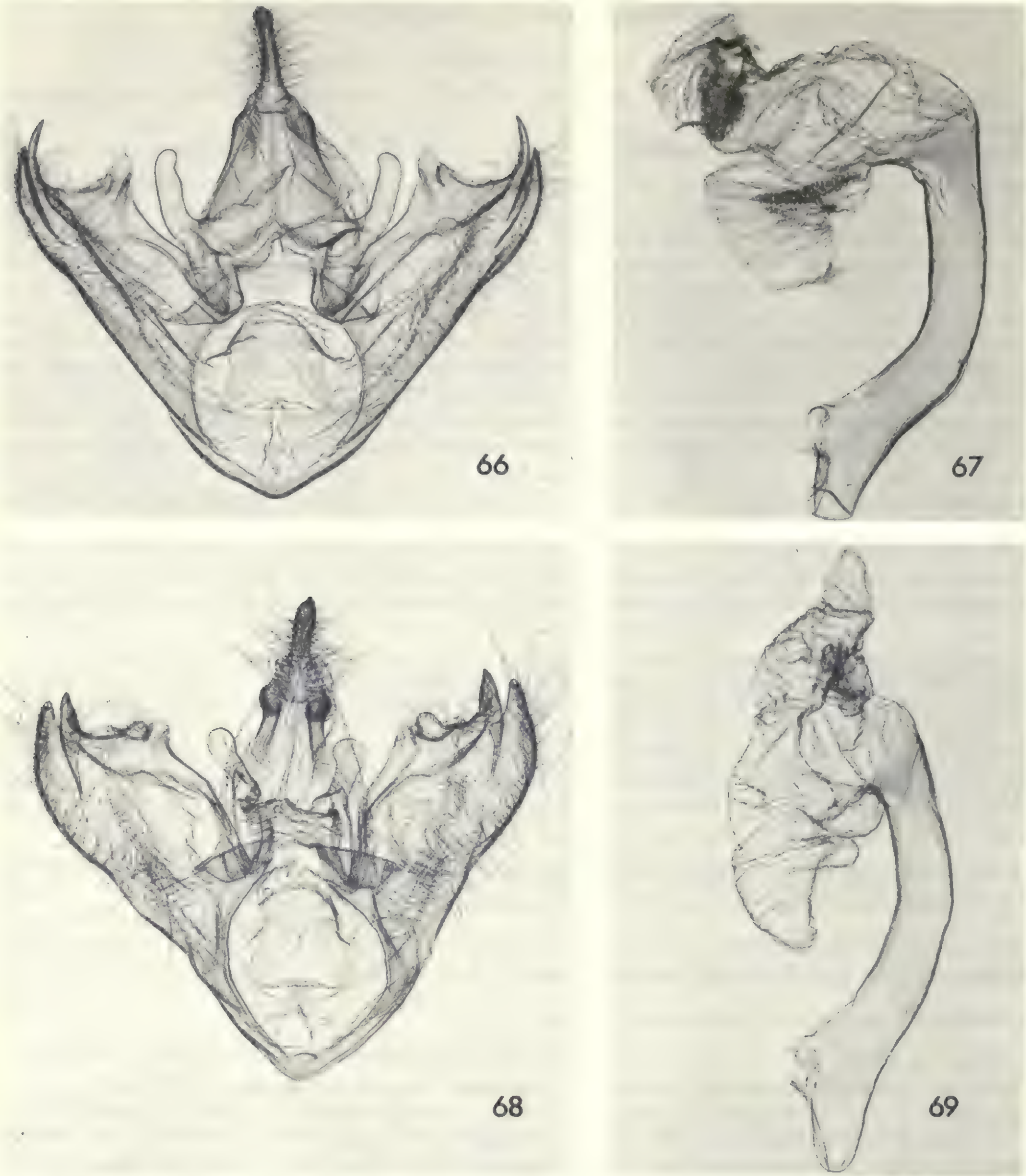
Halisidota steinbachi Rothschild, lectotype ♂, **Argentina**: Tucumán (*J. Steinbach*) (BMNH).

Argentina: 1 ♂, 1 ♀, Tucumán (*Steinbach*) (BMNH) (paralectotypes); 2 ♀, Salta (*Steinbach*) (1 ex. iv.–xi.1903) (BMNH) (paralectotypes); 1 ♂, 4 ♀, Ciudad de Tucumán, 450 m, i.1901, iii.1903 (*Monetti, Dinelli*) (BMNH) (paralectotypes); 9 ♂, 5 ♀, Tucumán (BMNH, ZSBS); 2 ♀, Ciudad de Tucumán, iii, xi, xii.1901, 1903 (BMNH); 7 ♂, 'Tucuman City, Horco Molle', 10.xi.1967 (CM); 52 ♂, 19 ♀, Tucumán Prov., Parque Sierra San Javier, Horco Molle, 700 m, ix.1960, 9.iii, 22–24.xi.1973 (AMNH (1 ♂), LACM); 1 ♂, Salta (BMNH); 22 ♂, 5 ♀, La Rioja, i.ii.1918 (BMNH); 1 ♂, 2 ♀, Olivos, La Lucilla, 17–26.iii.1952, 12.xi.1953 (ZSBS); 1 ♀, Buenos Aires Prov., Tandil, 250 m, iii.1956 (ZSBS). **Bolivia**: 4 ♂, 1 ♀, La Paz, 1500–2000 m (ZSBS); 1 ♀, Cochabamba, El Limbo, 2000 m, 16.xii.1961 (ZSBS). **Brazil:** 1 ♀ (BMNH).

Halysidota fuliginosa Rothschild **sp. rev.**

(Figs 19, 20, 68, 69)

Halisidota fuliginosa Rothschild, 1909: 282. LECTOTYPE ♂, MEXICO (BMNH), here designated [examined].
Halisidota fuliginosa Rothschild; [Rothschild], 1911: pl. 11, fig. 1 (lectotype) [fig. 2 is of *H. atra* Druce].
Halisidota carinator Dyar, 1912: 51. Lectotype ♂, MEXICO (USNM), designated by Watson, 1971: 20 [examined]. **Syn. n.**



Figs 66–69 *Halysidota* ♂ genitalia. (66, 67) *steinbachi* lectotype, slide 2151. (68, 69) *fuliginosa*, slide 2260, Mexico.

Halisidota cinctipes ab. *meta* Strand, 1919: 74. Holotype ♀, Guatemala (BMNH) [examined]. [Infrasubspecific name.]
Halisidota cinctipes ab. *carinator* Dyar; Seitz, 1922: 412 [but misspelt as '*caripator*'].

Description. ♂ and ♀. Yellow form. Forewing: ♂, 25–26 mm; ♀, 27–29 mm. Clypeofrons black except for orange-yellow area above labrum. Vertex pale orange-brown, with faint greenish blue band between antennae. Basal segment of palp brownish orange anteriorly, black posteriorly: second segment black irrorate with greyish white and with brownish orange patch at middle; third segment as second, but with orange patch. Dorsal surface of antenna brownish orange basally; remainder dark brown. Longest antennal pectination three times diameter of shaft at that point. Patagia and tegulae brownish orange; both bordered posteriorly and medially with bluish green; each tegula with black longitudinal streak in middle. Rest of thorax brownish orange, with bluish green mid-dorsal line and dark brown band extending from eye to base of forewing. Microtymbal number: 11 to 12. Outer surfaces of legs very pale brownish orange, rear surface brownish orange; markings black or, more commonly, a mixture of black and white scales edged with black. Forewing very pale brownish orange above; fasciae orange-brown, except for brownish orange costal and discocellular markings; under surface paler. Hind wing pale brownish orange, with trace of brown apical marking in few specimens examined. Abdomen brownish orange dorsally, much paler ventrally; black lateral spots present on segments 3 to 8 (♂) or 3 to 6 (♀).

Brown form. This differs from the pale form in the darker, more brownish coloration of the head, thorax, legs and forewings, in the greyish brown hind wings and in the coloration of the abdomen, which is dark brown dorsally except for segment 1 and tail tuft which are brownish orange. This form is represented in the material studied only by the type of *fuliginosa*, a male from Cuernavaca, Mexico (USNM), and another from Zacualpan, Mexico (AMNH). A male from Jalapa, Mexico, and two from Orizaba, Mexico (USNM, AMNH), are intermediate in coloration between the brown and yellow forms.

♂ genitalia. Apical processes of valve about equal in length; apical costal process usually with small rounded pre-apical emargination on medial side [not present in Fig. 68]; non-setose mid-costal process angulate laterally when viewed ventrally. Vincular lobes often weakly clavate; about three times as long as least width. Lobes of tegumen variable in size and may be less well developed than in Fig. 68; spines just visible at ×32. Large anterior lobe of vesica bearing three smaller lobes on left-hand side, the largest of these minutely scobinate.

DIAGNOSIS. In both colour-forms the confluence of the subterminal with the terminal fascia at the middle of the outer margin is generally diagnostic. The combination of this character, the uniform tone of the markings and the overall brownish orange coloration provide a set of characters sufficient to distinguish most specimens of the pale form from the rest of the *tessellaris*-group. Males can be identified with certainty by examination of the genitalia.

STATUS. Dyar's (1912: 51) description of *carinator* included a comment that the name might prove to be a junior synonym of the already described *fuliginosa*. Dyar's supposition has been confirmed, so that the species *fuliginosa* has as its type-specimen an example of the apparently rare brown form. Travassos (1963: 476, 477) wrongly synonymized *fuliginosa*, *carinator* and *meta* (which then arguably attained subspecific rank) with *tessellaris*.

LECTOTYPE. The specimen chosen as lectotype of *fuliginosa* was the only one of the four syntypes to bear a large, red, handwritten label in Rothschild's handwriting 'Halisidota fuliginosa Rothsch. Type'. The remaining 3 syntypes are females of a new subspecies of *atra*.

DISTRIBUTION. Most of the material examined was caught in Mexico and Central America, but single specimens from Cuba, Florida and California have been examined. The handwritten label attached to the Californian specimen appears to read 'Ben Lomond, Calif.'. Ben Lomond is a town some five miles from the coast midway between Monterey and San Francisco, and the occurrence there of *fuliginosa* may have resulted from a chance introduction from shipping originating in Mexico.

Two male specimens from Venezuela in the BMNH are tentatively associated here with *fuliginosa*. Both have a narrower terminal fascia on the forewing and have darker postmedial, discocellular, medial, antemedial and basal markings. The specimen labelled simply 'Venezuela' has a spinose vestiture on the smaller of the two lobes on the left-hand side of the anterior vesical lobe; the specimen from Mérida has this small lobe scobinate to the same degree as the larger lobe.

MATERIAL EXAMINED

Halisidota fuliginosa Rothschild, lectotype ♂, **Mexico**: Cuernavaca (BMNH). *Halisidota carinator* Dyar, lectotype ♂, **Mexico**: Jalapa (USNM).

U.S.A.: 1 ♂, California, Ben Lomond (USNM); 1 ♀, Florida (*E. L. Graef*) (USNM). **Cuba**: 1 ♂ (BMNH). **Mexico**: 1 ♀, Sinaloa, 44 miles [70.8 km] E. of Villa Union, 27.viii.1960 (LACM); 10 ♂, 5 ♀, [Vera Cruz state,] Orizaba (AMNH iv.1913–viii.1920, BMNH, MNHN, USNM); 4 ♂, 7 ♀, [Vera Cruz,] Jalapa, 23.iv.–ix.1913, 1922, 1931 (AM, AMNH, BMNH, MNHN, ZSBS); 1 ♂, [Vera Cruz,] Cordoba region (BMNH); 1 ♂, 4 ♀, [Vera Cruz,] Coatepec (BMNH, USNM); 1 ♀, Vera Cruz, 1 mile [1·6 km] S. of Pueblo Calcahualco, 6200 ft [1880 m], 20.vii.1973 (LACM); 2 ♂, 1 ♀, Puebla [state], near Zacapoaxtla, 1.ix.1971, Finca San Juan Apulco, 1.ix.1971 (LACM); 1 ♀, Morelos, ix. (LACM); 1 ♂, [Morelos state,] Cuernavaca (USNM); 1 ♂, 2 ♀, [Morelos,] Zacualpan, vii, ix.1913 (AMNH); 1 ♂, [Jalisco state,] Vulkan Colima, 9.v.1973 (ZSBS); 2 ♂, Chiapas (LACM); 3 ♂, 1 ♀, Union Juarez, 7.vi.–2.xi.1972 (LACM); 5 ♂, Chiapas, San Cristobal de las Casas, 2150 m, 1–5.viii.1966, 7–8.ii.1969, 27.i.1973 (AM, USNM); 2 ♂, 1 ♀ 'Mexico' (AMNH, BMNH). **Guatemala**: 2 ♂, Huehuetenango, Municipio Santa Cruz, Barillas, Chiblac, 15.viii, 12.ix.1974 (BMNH); 4 ♂, 11 ♀, Chajsel, Municipio Coban, Alta Verapaz, 1400 m, 29.xii.1972 (LACM); 1 ♀, Solota, 5 km NE. of Panajachel, 1700 m, 14–15.viii.1974 (LACM); 58 ♂, 37 ♀, Santa Maria de Jesús, Quetzeltenango, 1550 m, 30.ix, i.x (LACM); 1 ♀, Guatemala City (BMNH); 2 ♂, 'Guatemala' (MNHN). **Honduras**: 1 ♂, SE. Flores, Rancho Chiquito, 2–3.viii.1967 (USNM). **El Salvador**: 1 ♂, Cerro Verde, 6.viii.1967 (USNM). **Costa Rica**: 9 ♂, 1 ♀, Puntarenas province, N., Cordillera de Tilaran, Monteverde, 1400 m, 12.iii.1960, 26.ii.1962, 12–15.vi.1974 (AMNH, BMNH, LACM); 2 ♂, 1 ♀, San José province, 14 miles [22·5 km] N. of San Isidro del General, 1600 m, 20–23.vi.1974 (BMNH, LACM); 1 ♂, 3 ♀, San José, 15.v, 10.vi (BM); 2 ♂, [Cartago province], Juan Viñas (BMNH, USNM); 1 ♂, 4 ♀, [Cartago province,] Vulkan Irazu, Orosi, 1200 m (BMNH); 2 ♂, 'Candalaria Mts' (BMNH); 5 ♂, 2 ♀, 'Costa Rica' (BMNH, MNHN).

Halysidota orientalis Rothschild **nom. rev., stat. n.**

(Figs 21, 70, 71)

Halisidota underwoodi orientalis Rothschild, 1909: 284. LECTOTYPE ♂, Trinidad (BMNH), here designated [examined].

Halisidota underwoodi orientalis Rothschild; [Rothschild], 1911: pl. 11, figs 30, 31 (fig. 30 of type).

Halisidota underwoodi modalis Dyar, 1912: 53. Lectotype ♂, Venezuela (USNM) [designated by Watson, 1971: 61] [examined]. **Syn. n.**

Description. ♂ and ♀. Forewing: ♂, 24–28 mm; ♀, 26–31 mm. Clypeofrons dark brown or black dorsally, paler brown ventrally; vertex pale brownish white. Basal two-thirds of first segment of palp clothed in mixture of black and greyish white scales, remainder orange-yellow; segment 2 black and greyish white with preapical orange-yellow lateral patch; segment 3 black and greyish white. Scape and basal four or five segments of antenna orange-yellow; basal segments orange-yellow, remainder dark brown above. Longest antennal pectination equal to about 2.5 times diameter of antennal shaft at that point. Patagia pale brownish white, edged posteriorly with blue-green. Tegulae pale brownish white fringed medially with blue-green; most specimens without markings, but short faint longitudinal brown streak in middle in few examples. Rest of dorsal surface of thorax orange-yellow with blue-green dorsal line. Lateral surface of thorax orange-yellow with dark brown area from posterior border of eye to base of hind wing; ventral surface mostly pale yellow but orange-yellow anteriorly. Microtymbal number: 11 to 12. Outer surface of legs orange-yellow, rest pale yellow; markings a mixture of black and greyish white, edged with black. Forewing pale brownish yellow above; markings pale greyish yellow-brown, but discocellular and costal elements dull yellow edged heavily with black; terminal fascia usually narrower than subterminal fascia. Under surface of forewing paler; markings poorly defined and not yellow costally. Hind wing very pale yellow, with trace of brown apical marking at apex. Abdomen orange-yellow dorsally, pale yellow ventrally, black lateral spot present on segments 3 to 8 (♂) or 3 to 6 (♀).

♂ genitalia. Spatulate apical process of sacculus extending distal to apical process of costa, the latter with shallow pre-apical emargination in most specimens. Non-setose costal process of valve slightly longer than setose costal process, strongly folded and directed at right-angles to costa. Vincular lobes clavate or not clavate, three to four times as long as least width. Lobes of tegumen with oblique rounded ridge posteriorly; rugose, not spinose. Scobinate anterior lobe of vesica with scobinate accessory lobe posterolaterally on right-hand side, and elongate transverse lobe at its base; this elongate lobe strongly spinose at dilated ventral end. Posterior lobe of vesica scobinate posteriorly and along left-hand side.

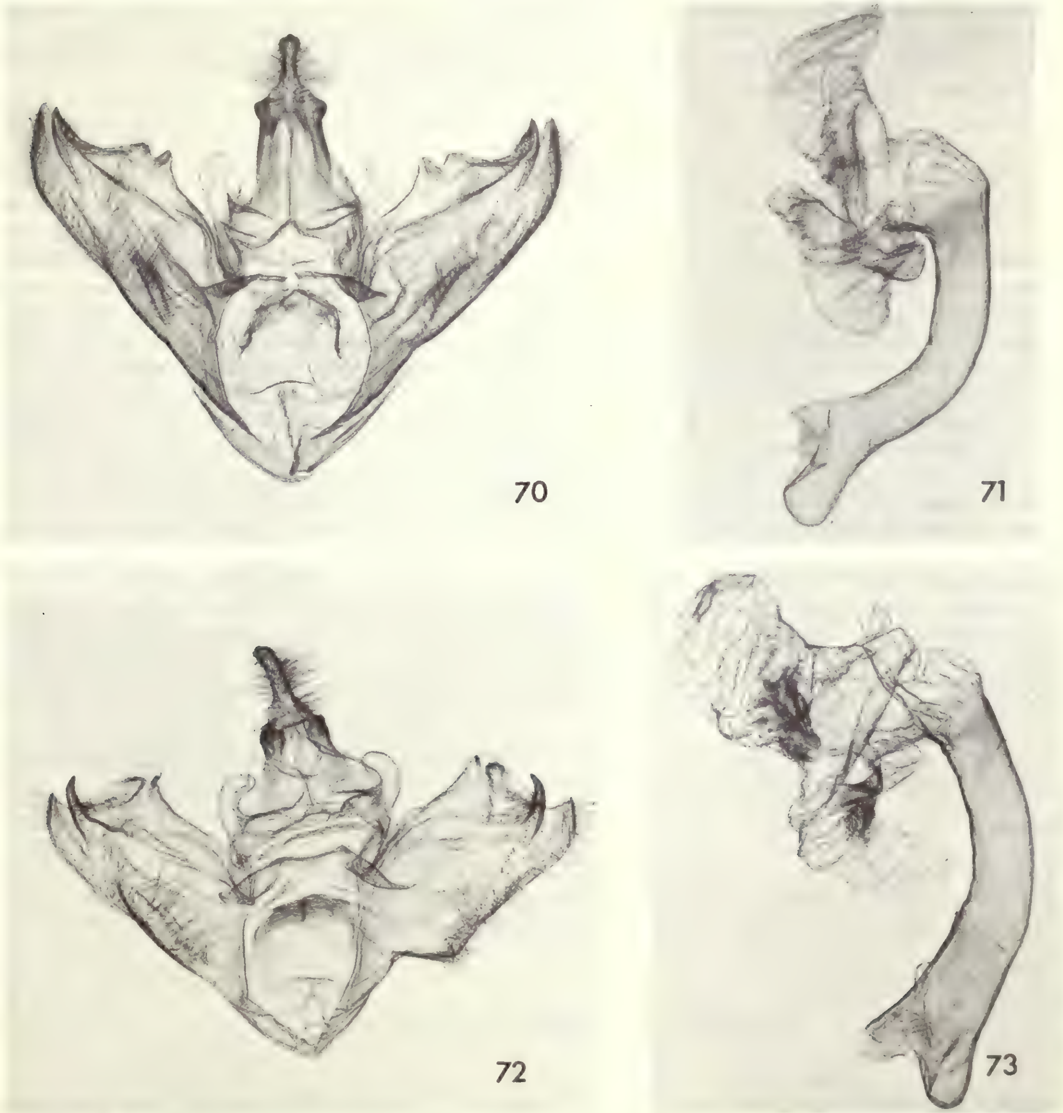
Diagnosis. *H. orientalis* differs from the similarly patterned sympatric *underwoodi* by the absence in most specimens of a dark longitudinal streak on the tegulae, the paler less yellowish coloration and by the generally narrower medial fascia on the forewing. The male genitalia readily separate these two species; the differently shaped valve apices can be seen without dissection in most specimens. Also similar externally to *pearsoni* but separable by the male genitalia.

Status. Seitz (1922: 413) listed *orientalis* and *modalis* as subspecies of *underwoodi*, following their original placement there by Rothschild and Dyar respectively. Both names were placed wrongly in the synonymy of *tessellaris* by Travassos (1963: 476, 477). Comparison of the types and of other specimens from Trinidad and neighbouring Venezuela has shown no differences between them, and that *modalis* should be considered a junior synonym of *orientalis*.

DISTRIBUTION. This species has been captured in Mexico and the Antilles southwards to Brazil. Large gaps in the known distribution presumably represent areas, at least in part, where collecting has either failed to produce *orientalis* or has not taken place. Two specimens in the BMNH from Corcovado, Chile, collected at 7,000 ft [2130 m] lack the oblique ridge on the lobes of the vinculum and may represent a new subspecies, but more material is needed to confirm this suggestion.

MATERIAL EXAMINED

Halisidota underwoodi orientalis Rothschild, lectotype ♂, **Trinidad**: Port of Spain (*F. Birch*) (BMNH). *Halisidota underwoodi modalis* Dyar, lectotype ♂, **Venezuela**: Aroa (USNM).



Figs 70–73 *Halysidota* ♂ genitalia. (70, 71) *orientalis*, slide 2233, French Guiana. (72) *conflua* paratype, slide 2225, Peru. (73) *conflua* holotype, slide 2345, Peru.

Mexico: 2 ♀, Nuevo Leon, 2 miles [3·2 km] S. of Monterey, Chipinque Mesa, 10.viii.1963 (USNM); 1 ♂, [Vera Cruz state,] Misantla, viii.1912 (BMNH); 6 ♂, 4 ♀, Chiapas state, Union Juarez, 28.x.–7.xi.1972 (LACM). **Guatemala**: 1 ♀, Cayuga (BMNH); 1 ♂, Las Mercedes (BMNH). **Costa Rica**: 1 ♂, 1 ♀, Puntarenas province, Osa Peninsula, 1·8 miles [2·9 km] W. of Rincon, 22, 25.ii.1971 (LACM). **Panama**: 2 ♂, 2 ♀, Panama Canal Zone, near Colon, Francefield, 27, 30.x.1924 (BMNH). **Colombia**: 1 ♀, Popayan (USNM); 1 ♂, Cundinamarca, Monterredondo, 1420 m, 25.xii.1961 (ZSBS); 1 ♀, Medina, 500 m (BMNH). **Windward Islands**: 1 ♂, 1 ♀, Grenada, Grand Etang, 23.x.–1.xi.1975 (USNM). **Trinidad**: 17 ♂, 14 ♀, Curepe, iv.–xii.1968, 1969 (BMNH); 2 ♀, Belmont, Port of Spain (BMNH); 1 ♂, 2 ♀, Port of Spain (BMNH) (paralectotypes of *H. orientalis*); 2 ♂, 2 ♀, Caparo, xii.1905 (BMNH) (paralectotypes of *H. orientalis*); 1 ♂, Balandra, 3.x.1969 (BMNH); 1 ♂, St Anns (BMNH); 1 ♂, Narieva district, Tabaquite (BMNH) (paralectotype of *H. orientalis*); 2 ♂, 1 ♀, Arima Valley, 29.iv, 22.v.1951 (AMNH); 2 ♂, 5 ♀, no further data (BMNH). **Venezuela**: 1 ♂, San Esteban Valley, Las Quigas (USNM); 1 ♀, Caracas (BMNH); 1 ♂, Maracay (BMNH); 1 ♂, 1 ♀, Aragua, El Limon, 450 m, 25.viii.1962 (UCV); 2 ♀, Las Cruces, Colon, 250–750 ft [76–229 m] (BMNH). **Peru**: 1 ♀, La Merced, 2,500 ft [762 m] vii, viii.1903 (BMNH). **Guyana**: 2 ♂, 1 ♀ (BMNH) (paralectotypes of *H. orientalis*). **French Guiana**: 1 ♂, 1 ♀, St Jean de Maroni (BMNH). **Ecuador**: 1 ♂, Gorotiré (Toulgoët Coll.). **Bolivia**: 1 ♀, Prov. del Sora, Dep. Sta Cruz, 450 m, i. (BMNH). **Brazil**: 1 ♂, 1 ♀, Pará (BMNH); 1 ♂ [Pará] Obidos (CM); 2 ♂, Pernambuco state, Serra de Communaty, 1893 (BMNH); 2 ♂, Rio State, Terezopolis, Barreira, 350 m, 3–4.i., 22–24.ii.1957 (BMNH).

Halysidota conflua sp. n.

(Figs 22, 23, 72, 73)

DESCRIPTION. ♂ and ♀. Forewing: ♂, 26 mm; ♀, 28 mm. Clypeofrons dark brown, becoming paler towards labrum; vertex yellowish white. Basal and second segments of palp orange-yellow proximally, dark brown distally; third segment dark brown. Antennal scape pale orange-yellow; shaft yellowish white above proximally, remainder brown. Longest antennal pectination about twice diameter of shaft at that point. Patagia yellowish white with greenish blue posterior fringe. Tegula yellowish white with longitudinal black streak in middle; hair-scales of medial fringe orange-yellow proximally, greenish blue distally. Rest of thorax orange-yellow dorsally and laterally, with greenish blue mid-dorsal line; pale orange-yellow ventrally. Microtymbal number: 14. Legs orange-yellow (palest on inner surface); markings brown. Ground-colour of upper surface of forewing yellowish white; partly confluent yellow-brown fasciae becoming orange-yellow at costa and at end of cell; under surface of wing and fasciae pale yellowish brown at costa and at end of cell. Hind wing yellowish white, with brown marginal markings in apical region and along outer margin. Abdomen orange-yellow dorsally, paler ventrally, with dark brown lateral spot on segments 3 to 8 (♂) or 3 to 6 (♀).

♂ genitalia. Apical costal process of valve extending just distal to apical process of sacculus; costa straight between apex of valve and non-setose costal process. Vincular process between 2·5 and 3·0 times smallest diameter; strongly arcuate. Lobes of tegumen moderately well developed; spines just visible at × 8 magnification. Vesica similar in shape to that of *ruscheweyhi* and others; longest spine of anterior lobe about 2·5 times its diameter at base.

DIAGNOSIS. Distinguished externally from all other species of its group by the very broad, partly confluent medial and subterminal fasciae of the forewing.

DISTRIBUTION. Known only from Peru.

MATERIAL EXAMINED

Holotype ♂, **Peru**: Lobitos, 18.iv.1925 (*H. F. Slattery*) (BMNH).

Paratypes. **Peru**: 1 ♂, 1 ♀, Lobitos, iv.1925 (*H. F. Slattery*) (BMNH).

Halysidota underwoodi Rothschild sp. rev.

(Figs 27–33, 74, 75, 77)

Halisidota underwoodi Rothschild, 1909: 284. LECTOTYPE ♀, COSTA RICA (BMNH), here designated [examined].

Halisidota underwoodi Rothschild; [Rothschild], 1911: pl. 11, figs 3 and 4 [fig. 4 probably represents the lectotype].

Halisidota bricenoi Rothschild, 1909: 282. Lectotype ♂, VENEZUELA (BMNH), designated by Hampson, 1920: 283 [examined]. **Syn. n.**

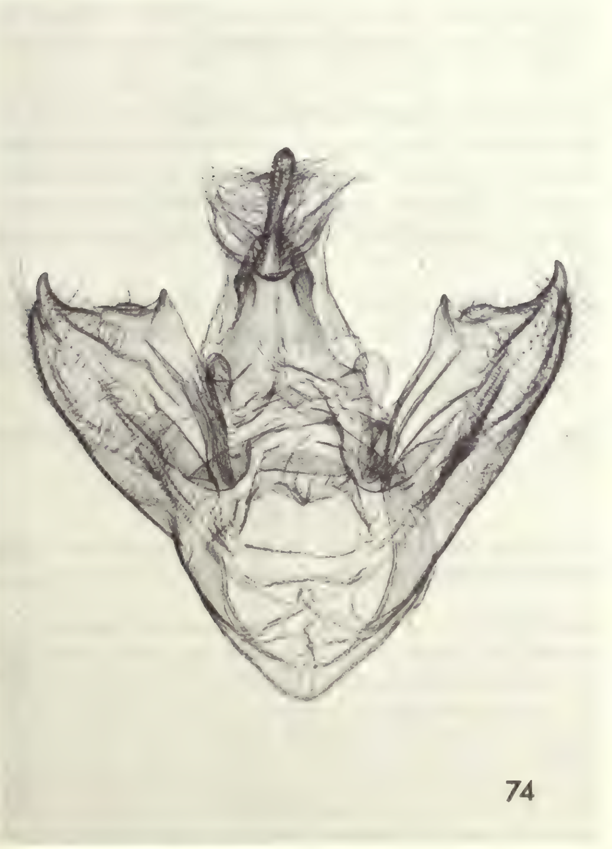
Halisidota bricenoi Rothschild; [Rothschild], 1911: pl. 11, figs 28 and 29.

Halisidota schausi meridensis Rothschild, 1909: 285. LECTOTYPE ♂, VENEZUELA (BMNH), here designated [examined]. **Syn. n.**

Halisidota cinctipes meridensis Rothschild; [Rothschild], 1911: pl. 11, figs 23 and 24 [fig. 23 probably represents the lectotype].

Halisidota cinctipes ab. *lucia* Strand, 1919: 74. Holotype ♀, VENEZUELA (BMNH) [examined]. [Infrasubspecific name.]

DESCRIPTION. ♂ and ♀. Forewing: ♂, 25–28 mm; ♀, 28–32 mm. Pale form, including lectotype of *underwoodi* and *meridensis*. Clypeofrons black; vertex yellowish brown, the scales tinged with bluish green distally between bases of antenna and posteriorly. Palp as for *orientalis*. Antenna (♂) orange-yellow above proximally, becoming dark brown at middle and unscaled distally; longest antennal pectination equal to about 2·5 times diameter of shaft at that point; six apical segments approximately triangular in shape in ventral view, non-serrate. Patagia yellowish brown edged posteriorly with bluish green. Tegulae yellowish brown fringed medially and posteriorly with bluish green and with black longitudinal streak at middle. Rest of dorsal surface of thorax orange-yellow, with bluish green mid-dorsal line. Lateral and ventral surfaces of thorax orange-yellow, but black around eyes and in band extending from eye to base of hind wing. Microtymbal number: 12 to 13. Outer surface of legs orange-yellow, inner surface pale yellow; markings a mixture of black and white scales edged with black. Forewing pale brownish yellow; markings yellowish brown; discocellular marking and costal elements of fasciae darker in tone, orange-yellow; subterminal fascia sometimes interrupted in middle of wing and often connected to terminal fascia at M_2; medial fascia often broad (three times as long as broad); under surface paler, without orange-yellow costally or in discocellular marking. Hind wing pale orange-yellow, with small brown apical marking. Abdomen orange-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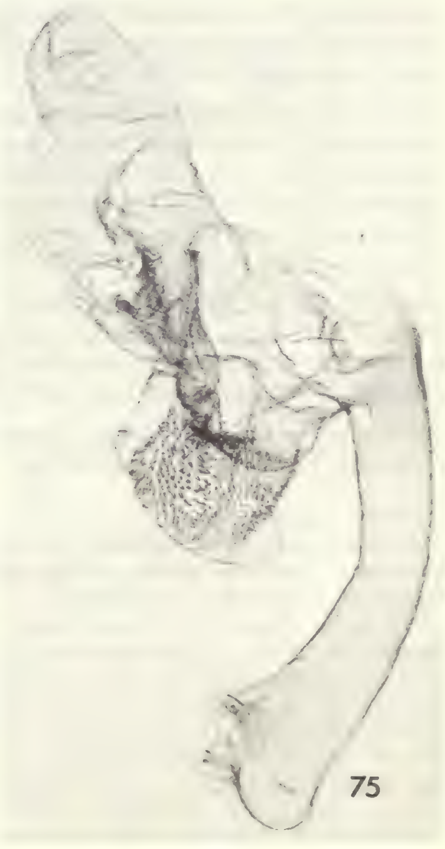
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Figs 74, 75 *Halysidota underwoodi* ♂ genitalia, slide 2234, Mexico.

yellow dorsally, pale yellow ventrally; black lateral spot present on segments 3 to 8 (♂) or 3 to 6 (♀); some specimens with black mid-ventral marking on segment 3 (and rarely segment 4) in male, and on segments 3 to 6 in female.

Dark form, including lectotype of *bricenoi*. This is well illustrated in colour by Rothschild (1911: pl. 11, figs 28, 29) and Seitz (1922: pl. 59—*bricenoi*). It differs from the pale form in the dark yellowish brown coloration of the dorsal surfaces of the head, thorax, wings and abdomen and of the under surface of the wings. The ventral surface of the thorax and abdomen is buff and there is some deep brownish yellow coloration on the palps, antennae and the outer surface of the legs.

♂ genitalia. Apical costal process of valve extending distal to apical process of sacculus. Non-setose mid-costal process of valve longer than or equal in length to setose process. Vincular lobes short, about as long as broad. Lobes of tegumen moderately well developed; spines readily visible at ×32 magnification. Anterior lobe of vesica spinose at its base on left-hand side and with small accessory lobe (the latter minutely spinose anteriorly; posterior lobe of vesica scobinate).

VARIATION. Specimens intermediate in coloration between the pale and dark forms occur in both Central and South America. The forewings of these specimens are yellowish brown, and the hind wings a darker brown except for a yellowish orange anal area. The abdomens of these specimens are orange-yellow above, not brown as in the dark form of the species.

Variation in the form of the subterminal fascia is illustrated in Figs 27–33. The anal part of this fascia is usually better developed than in *pectenella*. In some South American specimens (e.g. the lectotype of *meridensis*, Fig. 29) there is a reduction in the degree of black scaling around the discocellular marking and the costal elements of the basal, antemedial and medial fasciae.

DIAGNOSIS. Probably most likely to be confused with *orientalis*, but differs in the presence of a black streak on the tegulae, a generally broader medial fascia, and, in the pale form of the species, a more yellowish coloration. The male genitalia also separate these two species. Distinguished from *pearsoni* by the presence of dark scales on the veins crossing the subterminal and terminal fasciae on the upper surface of the forewing and by the shape of the valves and vesica in the male genitalia.

STATUS. The names *underwoodi, bricenoi* and *meridensis* were placed wrongly in the synonymy of *tessellaris* by Travassos (1963: 476). An examination of the types representing these three names has shown them to be conspecific and as first reviser (Article 24a of the *Code*) I select *Halysidota underwoodi* Rothschild as the name of this species. (Applying page priority would have resulted in accepting *bricenoi* as the valid name, and the type of *bricenoi* is an example of the less common dark form of the species.)

LARVA. Described by Avril Fox (pers. comm.) as dark brown, with pale yellow anterior and posterior hair-tufts; the anterior hair-tufts partly posteriorly directed and partly anteriorly directed. The food-plant was identified by the Agronomy Faculty of the Universidad Central de Venezuela at Maracay as a species of *Acalypha*, possibly *A. macrostachya* (Euphorbiaceae).

DISTRIBUTION. U.S.A., Mexico, Guatemala, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Ecuador, Peru and Bolivia.

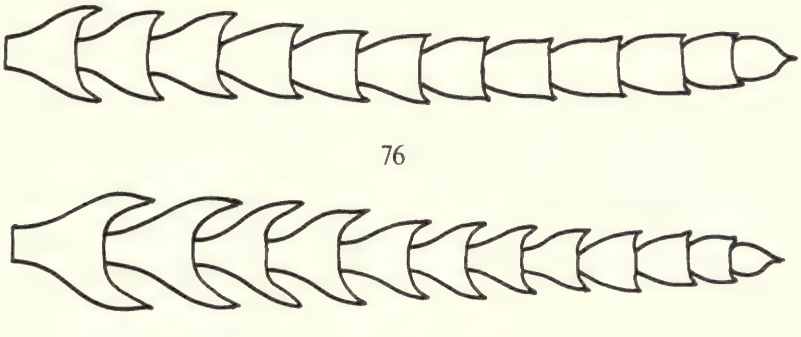
MATERIAL EXAMINED

Halisidota underwoodi Rothschild, lectotype ♀, **Costa Rica** (BMNH). *Halisidota bricenoi* Rothschild, lectotype ♂, **Venezuela**: Mérida (*Briceno*) (BMNH). *Halisidota schausi meridensis* Rothschild, lectotype ♂, **Venezuela**: Mérida (*Briceno*) (BMNH).

Pale form. **U.S.A.**: 1 ♂, Texas, Harris County (CM); 1 ♀, California, Ben Lomond. **Mexico**: 1 ♀, 'Mexico' (BMNH); 1 ♂, San Luis Potaro, Tamazunchale, 300 ft [90 m], 2.xi.1975, 26.iii.1977 (AMNH); 1 ♀, Vera Cruz (paralectotype of *H. underwoodi* Rothschild); 6 ♂, 4 ♀ [Vera Cruz state,] Orizaba, i, iii.1896 (AMNH, BMNH, USNM) (including 1 ♂ and 1 ♀ paralectotype); 1 ♂, Vera Cruz, San Andres Tuxtla, ix.1939 (AMNH); 4 ♀, [Vera Cruz state,] Misantla, viii.1912, xii.1914 (BMNH, ZSBS); 1 ♂, 8 ♀, [Vera Cruz state,] Jalapa (AMNH, BMNH, ZSBS); 1 ♂, Hidalgo, Chapulhuacan, 19.ix.1971 (LACM); 1 ♀, Puebla, near Zacapoaxtla, Finca San Juan Apulco, 2.ix.1971 (LACM); 1 ♂, Oaxaca, 24 miles [38 km] S. of Valle Nacional, 6600 ft [2000 m], 24–25.vii.1970 (LACM); 1 ♂, Chiapas, Tapachula, Finca Violetta, 22.x.1954 (ZSBS); 3 ♂, 7 ♀, Chiapas, Union Juarez, 24–31.x, 1–3.xi.1972 (LACM); 1 ♂, 1 ♀ Chiapas, Rancho Santa Rosa, 91°20′W, 16°10′N, 12.iv.1975 (LACM). **Guatemala**: 21 ♂, 2 ♀, Quetzaltenango, Santa María de

Jesús, 1550 m, 30.ix, 1.x.1976 (BMNH, LACM); 1 ♀, Zacapa, La Union, 850 m, 30.viii, 26.xi.1972 (LACM); 11 ♂, 11 ♀, Chiblac, Barillas, Municipio Santa Cruz, 1000 m, 9.viii.–19.x.1974 (BMNH). **Nicaragua**: 3 ♂, 1 ♀, Jinotigua road, Km 148, 1400 m, 30.iii.1970 (Toulgoët Coll.). **Costa Rica**: 9 ♂, 11 ♀, Puntarenas Province, Monteverde, 1400 m, 26.ii–1.x.1960, 12–15.vi.1974 (AMNH, BMNH, LACM); 14 ♂, 31 ♀, San José province, 14 km N. of San Isidro del General on Pan-American Highway, 1600 m, 18–25.vi.1971, 20–23.vi.1974 (BMNH, LACM); 1 ♂, 3 ♀, San José Province, Cerro de la Muerte, Villa Mills, 3100 m, 21.vi.1971, 18–19.vi.1974 (LACM); 1 ♂, 2 ♀, San José (BMNH); 1 ♂, 1 ♀ [Cartago province,] Juan Viñas (BMNH, USNM); 2 ♂, 5 ♀ [Cartago province,] Volcan Irazu, 1200 m (BMNH); 2 ♀, [Cartago province,] Ojo de Agua, Route 2, Km 75, 30.vi.1967 (USNM); 1 ♀, near Cartago, 1500 m, 1910 (MNHN); 1 ♂, Tuis (BMNH) (paralectotype of *H. underwoodi* Rothschild); 1 ♂, 1 ♀, Candalaria Mts (BMNH); 1 ♀, Puntarenas province, Osa Peninsula, 1·8 miles [2·9 km] W. of Rincón, 22.ii.1971 (LACM). **Panama**: 1 ♀, Lino, 800 m (BMNH). **Colombia**: 1 ♂, 1 ♀, San Antonio, 2000 m, xii.1907 (BMNH); 1 ♂, Barbosa, 16.v.1961 (ZSBS); 2 ♂, 2 ♀, 1 ♀, Santander del Norte, Bella Vista, 2300 ft [700 m] (AMNH); 1 ♂, Minca, Sta Marta, 13.vii.1913 (CM); 1 ♀, Cundinamarca, Monterredondo, 1420 m, 28.ix.1961 (ZSBS); 2 ♂, 'Colombia' (AMNH). **Venezuela**: 10 ♂, 14 ♀, Aragua, Rancho Grande, 1150 m, 12–15.vii.–14.viii.1946, 7.iii.–4.x.1962–1976 (AM, AMNH, BMNH, LACM, Toulgoët Coll., UCV); 1 ♂, 4 ♀, Caracas (BMNH); 1 ♂, Maracay (ZSBS); 5 ♂, 14 ♀, Mérida (BMNH, MNHN, USNM); 2 ♂, Barinas, La Chimenea, 5 km Sur La Soledad, 1500 m, 2–3.vii.1975 (UCV); 1 ♂, 3 ♀, 'Venezuela' (BMNH, including type of ab. *lucia* Strand, USNM). **Ecuador**: 1 ♀, Pichincha, 'Rte S° Domingo I.C. Quito km. 16', 65 m, 19–22.i.1975 (Toulgoët Coll.); 1 ♂, 1 ♀, Pichincha, 'Palma/Texaco', 1650 m, 27.iv.1976 (Toulgoët Coll.); 1 ♂, 1 ♀, Pichincha, 'Qui/Chiriboga/k 33', 2650 m, 25.iv.1976 (Toulgoët Coll.); 1 ♀, Tinalandia, near Santo Domingo, 700 m, 16–19.vi.1977 (ZSBS); 1 ♀, Bolivar province, Balzanamba, ix.1893–11.1894 (BMNH). **Bolivia**: 1 ♂, Coroico (BMNH).

Dark form. **Venezuela**: 15 ♂, 25 ♀, Mérida, 1500 m and 1630 m, v.1899, 18.iv.1975 (BMNH, UCV, USNM). **Colombia**: 1 ♀, Popayan (USNM). **Peru**: 1 ♀, Chanchamayo, La Merced (USNM).



Figs 76, 77 *Halysidota*, apical segments of ♂ antenna. (76) *pectenella*, (77) *underwoodi*.

Halysidota pectenella sp. n.

(Figs 34, 76)

Description. ♂ and ♀. Forewing: ♂, 22–25 mm; ♀, 27–29 mm. As for those small heavily marked specimens of *underwoodi* having an incomplete subterminal fascia on the forewing and lacking brown scales on the hind wing, but separable from most specimens of *underwoodi* by the narrower terminal fascia, the more heavily marked discocellular markings and costal elements of the medial, antemedial and basal fasciae, by the paler ground-colour of the upper surface of the wings, and in the male by the shape of the apical segments of the antenna (see Figs 34, 76). The male genitalia are identical to those of *underwoodi*.

Remarks. Heavily marked specimens of *pectenella* resemble *interlineata* in general appearance (but not in the male genitalia). *H. pectenella*, however, invariably retains subterminal markings in the middle of the forewing, whereas *interlineata* has the subterminal markings restricted to the anal and/or costal margins of the wing.

VARIATION. A single dark brown, nearly black specimen has been examined during the present study; this is from Barinas state, Venezuela, and is in the collection of the UCV, Maracay. Noticeable variation in the colour-pattern is restricted otherwise to the subterminal fascia on the forewing which is commonly represented by small markings at the costa, between veins R_5 and M_3, and between CuA_2 and the anal margin, but lacks the costal marking in a few male specimens examined, and is nearly complete in one female.

DISTRIBUTION. Mexico, Guatemala, El Salvador, Costa Rica, Panama, Colombia, Venezuela, French Guiana, Ecuador, Peru, Bolivia, and possibly Brazil (see next section).

MATERIAL EXAMINED

Holotype ♂, **Guatemala**: Depto Zacapa, La Unión, 850 m, 21.x.1972 (*Welling*) (LACM).

Paratypes. **Mexico**: 1 ♂, Chiapas, 'Hamburgo', xii.1933 (AMNH); 1 ♂, Chiapas, Tapachula, Finca Violeta, 23.ix.1974 (ZSBS); 1 ♂, Chiapas, Rancho Santa Rosa, 91°20′W, 16°10′N, 5000 ft [1520 m], 12.iv.1975 (LACM). **Guatemala**: 1 ♀, Depto Alto V.P., Coban, 22–23.vii.1966 (USNM); 1 ♀, Guatemala City (BMNH); 3 ♂, Chiblac, Barillas, Municipio Santa Cruz, Huehuetenango, c. 1000 m, 13–15.viii.1974 (BMNH); 24 ♂, 1 ♀, type-locality, 8.x.–25.xii.1972, 1–8.i.1973 (LACM); 1 ♂, Cayuga (USNM). **El Salvador**: 1 ♀, L. Ilopango, 5.viii.1967 (USNM). **Costa Rica**: 1 ♂, 1 ♀, Cartago province, Turrialba, 14–17.v.1974, 1.ix.1974 (LACM, ZSBS); 2 ♂, [Cartago province,] Juan Viñas (CM, USNM); 2 ♂, 'Costa Rica' (BMNH). **Panama**: 3 ♂, Bocas, 13, 14.viii.1931 (BMNH). **Colombia**: 1 ♂, Nari River, Antioquia (USNM); 2 ♂, Cundinamarca, Monterredondo, 1420 m, 23.ix.1961 (ZSBS); 1 ♂, Rio Negro, 800 m (BMNH); 1 ♂, Depto Magdalena, Don Amo, 4000 ft [1220 m] (BMNH). **Venezuela**: 1 ♂, Barinas, San Isidro, 14 km Sur La Soledad, 1500 m, 1.vii.1975 (UCV) (the only known specimen of the dark brown form); 1 ♂, Barinas, La Chimenea, 5 km Sur La Soledad, 1500 m, 2–3.viii.1975 (UCV); 2 ♂, 2 ♀, Arugua, Rancho Grande, 1150 m, 12.iv.1972, 28.vi–18.vii.1974 (BMNH, LACM); 4 ♂, 1 ♀, San Esteban (BMNH); 3 ♂, Las Quiguas, near San Esteban (BMNH); 1 ♂, Miranda, Parque Nacional Guatopo, 24 km N. Altagracia de Orituco, 640 m, 30.i.1976 (BMNH). **French Guiana**: 1 ♀, Kourou, 150 m, 3, 4, ii.1971 (Toulgoët Coll.); 1 ♀, Cayenne (USNM). **Ecuador**: 1 ♂, 1 ♀, Tinlandia, near Santo Domingo, 700 m, 16–19.vi.1977 (ZSBS); 3 ♂, Tinlandia, Pichincha, 'Rte So Domingo, I.C. Quito km 16', 650 m, 19–22.i.1975, 18–19.iv.1977 (BMNH); 2 ♂, near Rio Pastaza, Route Puyo-Macas, Pastaza, 1050 m, 23.ii.1979 (Tougoët Coll.). **Peru**: 1 ♂, Chanchamayo (BMNH); 1 ♀, Junin, San Ramon, Est. Naranjal, 1000 m, 20–27.vii.1965 (AMNH); 1 ♂, Yahuarmayo, 1200 ft [366 m], iv–v.1912 (BMNH); 1 ♂, Tingo Maria, 20.ii.1950 (USNM); 1 ♂, Carabaya, Rio Huacamayo, 3160 ft [960 m], dry season, vi.1904 (BMNH) (a paralectotype of *H. underwoodi* Rothschild). **Bolivia**: 1 ♂, 2 ♀, Rio Songo, 750 m (BMNH, USNM).

Non-paratypic material. **Brazil**: 1 ♀, Pará (BMNH).

Halysidota atra Druce

(Figs 35, 36, 78, 79)

Halisidota atra Druce, 1884: 92.

DESCRIPTION. ♂. Clypeofrons dark brown or black; vertex brown. Palp dark brown or black; basal segment orange-yellow distally; second segment with orange-yellow patch laterally; second and apical segments irrorate with greyish white scales. Scape of antenna brown or orange-yellow; pedicel orange-yellow; remainder brown; longest antennal pectination (♂) about twice diameter of shaft at that point. Patagia brown, edged posteriorly with blue-green. Tegulae brown with black longitudinal streak in middle; hair-scales of medial fringe yellowish brown proximally, blue-green distally. Rest of thorax brown, with greenish brown mid-dorsal line and becoming orange-yellow ventrally. Outer surfaces of trochanter and femur of legs yellowish brown, tarsi yellowish brown proximally becoming orange-yellow distally or orange-yellow in ground-colour from base to apex; inner surfaces orange-yellow. Markings of legs a mixture of greyish white and black scales, edged with black. Microtymbal number: 12 to 13. Upper surface of forewing dark brown except for yellowish brown costal area. Fasciae edged with black scales, greenish yellow in costal area and at distal end of cell, otherwise yellowish brown. Subterminal fascia represented by marking at costa, usually another between veins M_2 and M_3 and a third at anal margin, or solely by costal marking. Terminal fascia greatly reduced or absent. Under surface of forewing similar to upper surface but markings less well defined. Hind wing brown. Abdomen orange-yellow, brown and orange-yellow, or dark brown dorsally and laterally; yellowish brown ventrally.

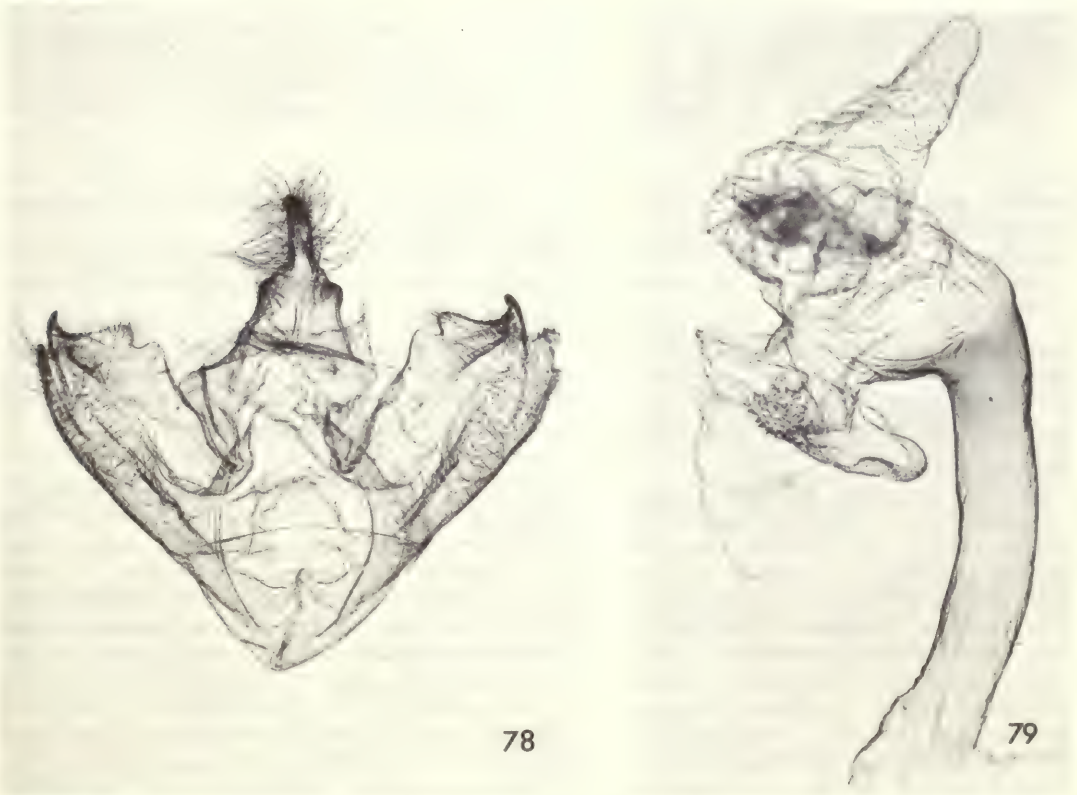
♂ genitalia. Apical costal process of valve extending distal to apical process of sacculus. Mid-costal processes of valve small; non-setose process slightly more prominent than setose process. Vincular lobes short, as long as broad or slightly longer than broad. Lobes of tegumen moderately well developed; spines just visible at × 32 magnification. Anterior lobe of vesica non-spinose distally; elongate lobe at base of anterior lobe spinose; tapered posterior lobe scobinate.

♀. Similar to male, but ground-colour of forewing pale yellowish brown; hind wing either entirely brown or, more commonly, pale yellowish brown becoming brown anally; all other brown areas much paler, more yellowish; and abdomen either brownish orange-yellow dorsally except for yellowish brown dorsomedial area or entirely dark brown dorsally.

DIAGNOSIS. Likely to be confused only with the dark form (known from a single male) of *pectenella*, but the antenna of *atra* is similar to that of *underwoodi* (Fig. 77) apically, and the shape of the valve and ornamentation of the vesica is diagnostic. The nominate subspecies of *atra* differs from the dark form of *pectenella* in its dark brown antennal scape.

VARIATION. This is the only species of its group in which there is no pale or yellow form of the male. Females vary to a limited extent (in the nominate subspecies) in the coloration of the abdomen, as well as between subspecies. All the females examined have at least partly brown hind wings.

DISTRIBUTION. Both subspecies have been recorded from Colombia. The nominate species is represented there by two specimens: a female labelled simply 'Colombia' and a male labelled 'Nari River, Antioquia'; the male probably originating from the Rio Nare (6°12′N, 74°35′W) in



Figs 78, 79 *Halysidota atra* ♂ genitalia. (78) *atra atra*, slide 2348, Mexico. (79) *atra rindgei* paratype, CM slide, Bolivia.

the Magdalena Valley separating the Eastern Cordillera from the Western Cordillera. To the north, *atra atra* extends through Central America to Mexico. The subspecies *atra rindgei* is known in Colombia from a single female collected by Fassl labelled 'Ober Rio Negro, Ost Colomb. 800 m.'. There are several rivers named Negro in Colombia, but those at 6°08′N, 72°17′W and 6°08′N, 73°08′W on the eastern side of the Eastern Cordillera of the Andes are at the right altitude and the banks of one of these may be where Fassl obtained his specimen. If this is so, the Eastern Cordillera may prove to be a barrier between the two subspecies in this part of their range. The other possible locality for this Fassl specimen is the upper reaches of the Rio Guainia, a tributary of the Amazon river, which at lower elevations in Brazil becomes the Rio Negro, but the stated altitude of 800 m makes this unlikely.

LECTOTYPE. The specimen chosen as lectotype of *atra* is one of two males from a syntypic series of two males and one female and is the only specimen bearing a label 'Type Sp. figured'. I have not accepted Hampson's (1901: 159) apparent type-designation of the female syntype 'Guatemala (*Champion*), 2 ♂, 1 ♀ type, Godman-Salvin Coll.'. Statements such as this are made elsewhere by Hampson listing first male then female specimens, followed usually without punctuation but less commonly by a comma (Hampson, 1901: 385) '6 ♂, 2 ♀, type'. An examination of several syntypic series listed by Hampson (1901) has shown that a statement by Hampson such as '2 ♂, 1 ♀ type' should be interpreted as '2 ♂, 1 ♀: type' and that such a statement indicates that one of the specimens listed (usually a male) was labelled as the type in the collections examined by Hampson (as stated by Gahan, 1926: [iii]). This argument applies to *atra*, in which the male syntype illustrated by Druce (1884: pl. 9, fig. 26) is the specimen which stood next to a round type-label in the BMNH collection curated by Hampson.

Key to subspecies

Scape of antenna dark brown	***atra atra*** (p. 44)
Scape of antenna orange-yellow	***atra rindgei*** (p. 45)

Halysidota atra atra **Druce**

(Figs 35, 36, 78)

Halisidota atra Druce, 1884: 92, pl. 9, fig. 26. LECTOTYPE ♂, GUATEMALA (BMNH), here designated [examined].

Halisidota atra Druce; [Rothschild], 1911: pl. 11, figs 10, 11 [fig. 10 is a ♂, probably Mexican; fig. 11 a ♀ from Costa Rica in BMNH, not a melanic specimen of *H. tessellaris* Smith as suggested by Travassos (1963: 487)].

DESCRIPTION. ♂ and ♀. Forewing: ♂ 21–24 mm; ♀ 24–29 mm. Scape of antenna dark brown or black, pedicel orange-yellow, rest of antenna dark brown dorsally. Terminal fascia of forewing represented usually only by apical marking, but continued as narrow band to M_3 or *CuA* in a few specimens. Female abdomen brown dorsally, brown becoming orange-yellow posteriorly, or wholly orange-yellow.

MATERIAL EXAMINED

Halisidota atra Druce, lectotype ♂, **Guatemala**: Las Mercedes, 3000 ft [910 m] (*Champion*) (BMNH).

Mexico: 4 ♂, 6 ♀, San Luis Potosi, Tamazunchale, 300 ft [90 m], 18.iii.–13.xii, 1952–1975 (AMNH, BMNH, USNM); 1 ♀, San Luis Potosi, El Salto Falls (AMNH); 1 ♀, San Luis Potosi, Xilitia, 3500 ft [1070 m] (AMNH); 1 ♀, [Vera Cruz state,] Orizaba (BMNH); 3 ♀, [Vera Cruz,] Cordoba, 16.v.1908, 22.xii.1965 (USNM); 6 ♂, 7 ♀, [Vera Cruz,] Misantla, vi–xi, 1909–1914 (AMNH, BMNH, USNM, ZSBS); 3 ♀, Vera Cruz, Catemaco, 12.vii.1973 (LACM); 2 ♀, Vera Cruz, Tapalapan (near Santiago Tuxtla), 2.vii.–11.ix, 1970–1973 (LACM); 1 ♂, Vera Cruz, Huatuxco (BMNH); 3 ♀, [Vera Cruz], Jalapa, 1 ♂, 1 ♀, 'Vera Cruz' (AMNH, BMNH); 1 ♀, Chiapas, Rancho Santa Rosa, 5600 ft [1710 m], 91°20′W, 16°10′N, 12.iv.1975 (LACM); 1 ♀, Chiapas, Tapachula, Vinca Violeta (ZSBS); 1 ♀. Chiapas, 12 miles [19·3 km] N. of Ocozocoantla, 10.vii.1971 (Toulgoët Coll.); 2 ♀, 'Mexico' (BMNH, ZSBS). **Guatemala**: 1 ♂, Cerro Zunil, 4000 ft [1220 m]; 1 ♀, Las Mercedes, 3000 ft [910 m] (BMNH); 4 ♀, Depto Zacapa, La Unión, 850 m, 29.viii.–1.xi.1972 (LACM); 3 ♀, Chiblac, Barillas, Municipio Santa Cruz, 1000 m, 8.viii.–4.x.1974 (BMNH). **Honduras**: 1 ♀, Lago Yojoa, Cortes (18 km NE. of El Mochito), 20–21.viii.1974 (LACM). **Nicaragua**: 1 ♀, 5·3 miles [8·5 km] E. of Matagalpa, 30.vii.1967 (USNM). **Costa Rica**: 1 ♂, 1 ♀, Juan Vinas (BMNH, USNM); 1 ♀, San José (BMNH); 1 ♀, Candelaria Mts (BMNH); 1 ♀, Orosi, 1200 m (BMNH); 1 ♂, 1 ♀, Cartago province, Turrialba, I.I.C.A. grounds, 600 m, 24–26.vi.1974 (LACM); 2 ♀, 'Costa Rica' (BMNH). **Panama**: 1 ♂, Chiriqui (USNM); 1 ♂, 1 ♀, Lino, 800 m (USNM). **Colombia**: 1 ♂, Antioquia, [Rio Nare] Nari River (USNM) [see species 'Distribution'] (USNM); 1 ♀, 'Colombia' (BMNH).

Halysidota atra rindgei subsp. n.

(Fig. 79)

Halisidota atra Druce; Seitz, 1922: 413, pl. 59, row e.

DESCRIPTION. ♂ and ♀. Forewing: ♂, 24–25 mm; ♀, 27–30 mm. Scape, pedicel and few basal segments of antennae orange-yellow, remainder of shaft brown. Terminal fascia of forewing usually represented by an apical marking, another between M_3 and CuA, and in most of the specimens examined by additional smaller markings on either side of the latter marking. Female abdomen dark brown dorsally (as dark as male abdomen).

DEDICATION. Named after Dr F. Rindge, ever helpful lepidopterist of the American Museum of Natural History in New York.

MATERIAL EXAMINED

HOLOTYPE ♂, **Peru**: North, River Tabaconas, 6000 ft [1830 m], 1912 (*A. E. & E. Pratt*) (BMNH).

Paratypes. **Colombia**: Rio Negro, 800 m [3°42'N, 74°48'W] [see species 'Distribution']. **Peru**: 1 ♂, same data and depository as holotype; 4 ♀, Carabaya, Santo Domingo, 6000 ft [1830 m], dry season, vi.1902 (BMNH) (including 3 paralectotypes of *Halysidota fuliginosa* Rothschild). **Ecuador**: 4 ♂, 7 ♀, Napo, Route Baeza-Tena, Cordillera Huacomayo, 1800 m, 20.ii.–22.xii.1978, 20–21.ii.1979; 1 ♀, Napo, Puerto Misahualli, 300 m, 29.xi.1978; 2 ♀, Napo, Route Baeza-Lumbaqui, Puete Azuela, 1600 m, 18.ii.1979; 3 ♀, Morona Santiago, Route Gualaceo Mendez Km 55, 1800 m, 22.i.1979; 1 ♂, 1 ♀, Zamora Chinchipe, Route Loja-Zamora Km 39, 1850 m, 26.i.1979; 1 ♀, Route Quito–Tago Agrio, 1500 m, 18.ii.1979. (All Ecuador ex. in Toulgoët Coll.) **Bolivia**: 2 ♂, 1 ♀, Cochabamba (1 ♀ from El Limbo, 2000 m, 6.xii.1962) (CM, Toulgoët Coll.); 2 ♀, Rio Songo, 750 m (BMNH); 1 ♂, Yungas de Palmar, 1100 m, xi.1960 (ZSBS).

Halysidota instabilis Dyar stat. n.

(Figs 24, 26, 80, 81)

Halisidota underwoodi instabilis Dyar, 1912: 53. Lectotype ♂, MEXICO [examined].
Halisidota underwoodi instabilis Dyar; Watson, 1971: 46, figs [lectotype designation].

DIAGNOSIS. ♂. Forewing: 27 mm. Probably indistinguishable from *donahuei* externally. Figs 24, 26 represent extreme forms of the male colour-pattern, which are matched exactly by corresponding forms of *donahuei*. In the male genitalia, *instabilis* differs from *donahuei* in the highly distinctive lateral margins of the uncus, the more elongate tegumen, the longer apical saccular process of the valve and the shorter non-setose mid-costal process.

AFFINITIES. See *donahuei*, p. 47).

TYPE-SERIES. One of the two paralectotypes listed by Watson (1971: 47) is conspecific with the lectotype (see list of material examined); the second paralectotype (collected in August and referred to by Dyar as 'lighter in colour than the others') is a specimen of *schausi*.

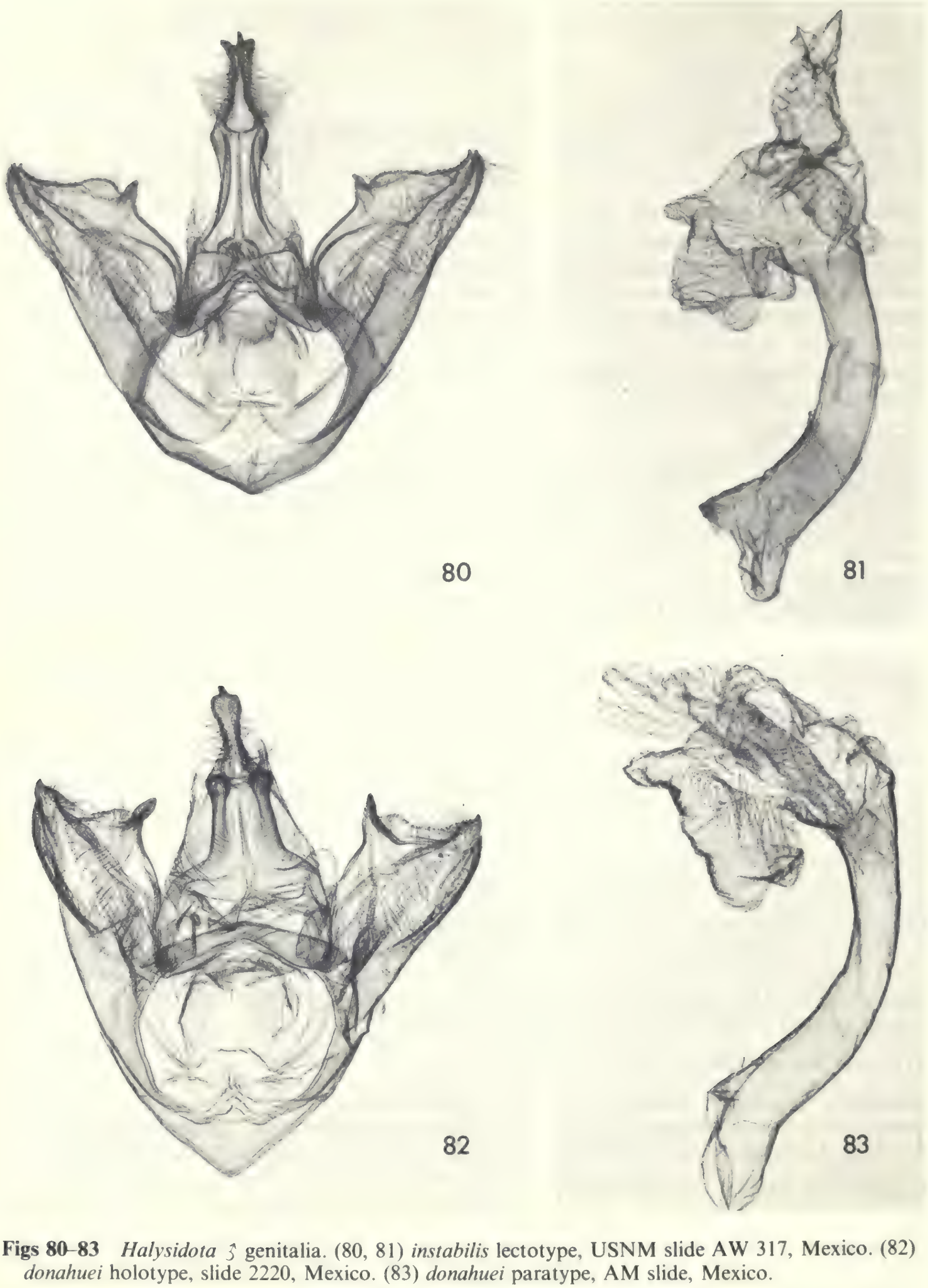
DISTRIBUTION. Mexico (but see below).

MATERIAL EXAMINED

Halisidota underwoodi instabilis Dyar, lectotype ♂, **Mexico**: [Morelos state,] Cuernavaca, June 1906 (USNM).

Mexico: 1 ♂ (paralectotype), [Morelos state,] Cuernavaca (USNM).

Material of doubtful identity. Nine females (Mexico, Guatemala, El Salvador) (AM, AMNH, BMNH, LACM, USNM) belong either to this species or to *H. donahuei* sp. n.



Figs 80–83 *Halysidota* ♂ genitalia. (80, 81) *instabilis* lectotype, USNM slide AW 317, Mexico. (82) *donahuei* holotype, slide 2220, Mexico. (83) *donahuei* paratype, AM slide, Mexico.

***Halysidota donahuei* sp. n.**

(Figs 25, 82, 83)

DESCRIPTION. ♂. Forewing: 25–27 mm. Clypeofrons black dorsally, becoming yellowish brown towards labrum; vertex very pale buff. Palp black, with orange-yellow band distally on segment 1 and at middle of segment 2; segment 2 and apical segment speckled with light grey scales. Scape, pedicel and basal few segments of antenna orange-yellow above, remainder dark brown; longest antennal pectination about twice diameter of shaft at that point. Patagia and tegulae very pale buff; the former edged posteromedially, the latter medially with greenish blue; tegulae with black longitudinal streak. Rest of thorax orange-yellow, with greenish blue mid-dorsal line. Outer surfaces of legs orange-yellow, inner surfaces pale orange-yellow; markings a mixture of black and white scales, edged with black. Microtymbal number: 12. Upper surface of forewing very pale buff (or brownish white). Fasciae edged with black; yellow in costal area and at distal end of cell, otherwise pale yellowish brown. Subterminal fascia represented by marking at costa and at anal margin and in some specimens by an additional marking between M_2 and M_3 or two extra markings, the latter plus another between R_5 and M_1. In four of the nine specimens examined, the black proximal border extends as marginal band along anal margin to basal fascia. Hind wing yellowish white, becoming more yellowish at outer margin and in anal region; pale yellowish brown markings restricted to apex of wing or to narrow marginal band extending to $1A$. Under surface of wings similar to upper surface, but less well marked and fascia without yellow scales costally or in discocellular marking. Abdomen orange-yellow dorsally, very pale yellow ventrally; segments 3 to 8 with black lateral marking.

♂ genitalia. Apical costal process of valve extends distal to apical process of sacculus; setose mid-costal process poorly developed, non-setose process prominent. Vincular lobes short, about as long as broad. Lobes of tegumen moderately well developed. Uncus spatulate towards apex and with short acuminate apical process. Spinose anterior lobe of vesica with two spinose accessory lobes, one anterior, one posterior and single non-spinose lobe at its base on left-hand side; posterior lobe of vesica scobinate.

DIAGNOSIS & AFFINITIES. Separable from *instabilis* by the male genitalia (see *instabilis*). Overall similarity between these two species indicates close phylogenetic affinities; the probably apomorphic, shared character state of a laterally expanded uncus suggests that they may be monophyletic in origin.

DISTRIBUTION. Mexico (but see *instabilis*, p. 45).

MATERIAL EXAMINED

Holotype ♂, **Mexico**: [Vera Cruz,] Jalapa (BMNH).

Paratypes. **Mexico**: 1 ♂, Tamaulipas [state], near Llera, 12.vi.1970 (AMNH); 1 ♂, San Luis Potosi, Tamazunchale, 20.v.1952 (AMNH); 2 ♂, Chiapas state, Cumbre de Arriaga, 15, 16.vi.1972 (LACM); 2 ♂, 'Mexico' (BMNH).

Material of doubtful identity. See *H. instabilis* Dyar.

***Halysidota cinctipes* Grote sp. rev.**

(Figs 1, 37–39, 84–86)

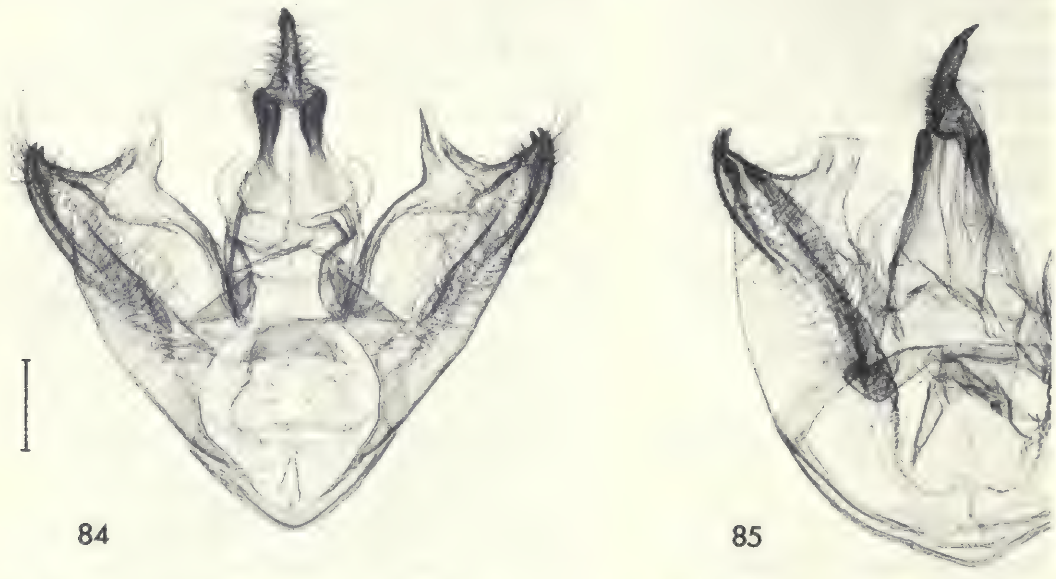
Halisidota cinctipes Grote, 1865: 242. LECTOTYPE ♂, CUBA (BMNH), here designated [examined].

DESCRIPTION. ♂ and ♀. Forewing: ♂, 22–28 mm; ♀, 26–29 mm. Clypeofrons dark brown, becoming paler towards labrum; vertex yellowish white. Palp dark brown speckled with greyish white; basal segment with orange-yellow distal band, second segment with orange-yellow band at two-thirds distance from its base to distal margin. Antenna yellowish white to about two-thirds of its length; remainder unscaled; longest pectination (♂) about 2·25 times diameter of shaft at that point. Patagia very pale buff with blue-green posteromedial fringe. Tegulae as patagia but whole of medial fringe blue-green and with black triangular spot anteriorly in some specimens. Rest of thorax orange-yellow dorsally, with blue-green mid-dorsal line; ventral surface pale yellow with pale greenish blue area ventral to eyes and ventral to forewing. Microtymbal number: 13. Outer surface of legs orange-yellow, inner surface pale yellow; markings a mixture of black and white scales edged with black. Forewing pale brownish yellow; markings yellowish brown replaced by yellow in costal area and at distal end of cell, edged with dark brown. Hindwing with small brown apical marking in most specimens. Under surface of wings as upper surface but less well marked and without yellow scales on forewing. Abdomen brownish orange-yellow dorsally, pale yellow ventrally; trace of black lateral spots present in some specimens.

♂ genitalia. Apical processes of valve about equal in length in most specimens. Non-setose mid-costal process of valve very large, with setose process reduced to carina on ventral surface at base of non-setose process. Vincular lobes long and arcuate; three to four times as long as diameter at mid-point. Tegumen lobes densely spinose; longest spine 0·04 mm in length. Vesical lobes as in Fig. 86.

VARIATION. Individual variation in colour-pattern is shown in Figs 37–39. Other specimens may lack the lateral extensions of the medial fascia along the anal margin of the forewing, and in the single known Bahamian specimen the subterminal fascia is reduced to one costal marking. From the small sample of material available, it appears that pale, poorly marked specimens (Fig. 39) are predominant in Florida, whereas all five of the Cuban specimens examined are well marked (Fig. 37). The large costal process in the male genitalia varies in shape and is arcuate (curved outwards) in some specimens.

DIAGNOSIS. In Florida *cinctipes* has been confused with *tessellaris*, but differs from the latter in the partly dark brown clypeofrons, the presence of greenish blue areas on the thorax ventral to the eyes and forewings, and the presence in some specimens of the lateral extension along the anal margin of the dark brown margin of the medial fascia. An examination (from the dorsal side) of the male genitalia, after brushing away surrounding scales, should confirm the identification of North American specimens. Separable from *ata* by the presence of greenish blue areas ventral to the eyes and forewings, and in the male genitalia by the shorter spines (0·04 mm) on the lateral lobes of the tegumen and by the less heavily spinose vesica.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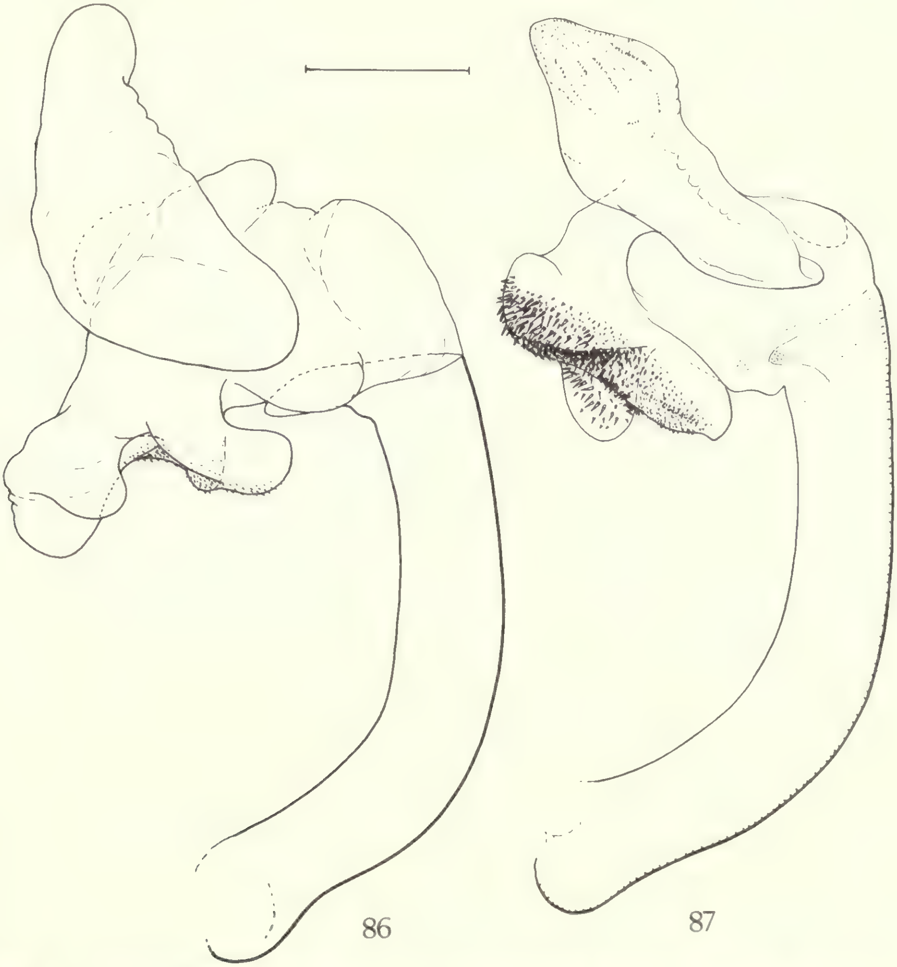
Figs 84, 85 *Halysidota cinctipes* ♂ genitalia. (84) LACM slide, Florida. (85) lectotype, NAS slide, Cuba.

RELATIONSHIPS. *H. cinctipes* is apparently replaced in the Dominican Republic and Puerto Rico by a sister-species *ata*, a relationship supported by overall similarity of these two species and by the presence in both of a greatly enlarged lobe on the costal margin of the valve, a character state interpreted as apomorphic. The sister-group of this pair has not been identified as such. Two other species, *yapacaniae* and *nigrilinea*, also have large costal lobes, but there are no other characters to support the suggestion that they are monophyletic, and it seems probable that there has been independent evolution of this character in each of these two species and in the sister-species *cinctipes* and *ata*.

STATUS. Travassos (1963: 475) placed *cinctipes* in the synonymy of *tessellaris*, an untenable action in view of the considerable differences between these two species.

DISTRIBUTION. Kimball (1965: 76) suggests that all records of this species from north of Oneco (central west-coast Florida) are suspect because of the past confusion between *cinctipes* and *tessellaris* in Florida. The northernmost specimen I have examined is from Port Sewall in Martin County. Elsewhere *cinctipes* has been identified from the Bahamas and the type-locality, Cuba. References in the literature to Puerto Rican material apply to *ata*; all other references are based probably on misidentifications. None of the names and localities associated with *cinctipes* (except for '*ata* Strand') by Strand (1919: 73, 74) refer to this species.

EARLY STAGES. Dyar (1896: 450–451) described the last three instars of the larval stage, which he summarized as 'like *tessellaris* but dark brown or silver grey brown with all the hair tufts white', and briefly described the cocoon. Dyar (1896: 451) gave the foodplants of specimens collected near Lake Worth, Florida, as Sea Grape, *Coccoloba floridana*, and *C. uvifera* (Polygonaceae) and suggested that *Hibiscus*, as recorded by Gundlach (1886: 269), is not a normal foodplant of *cinctipes*. Slosson (1901: 202) recorded *Trema micrantha* (Ulmaceae) as a foodplant in Miami, Florida, but this may be based on a misidentified larva as she stated that the larvae closely resembled *tessellaris* ('*H. tesselata*').



Figs 86, 87 *Halysidota* ♂ genitalia. (86) *cinctipes* aedeagus, lectotype, NAS slide, Cuba. (87) *ata* aedeagus, USNM slide, Dominican Republic.

MATERIAL EXAMINED

Halisidota cinctipes Grote, lectotype ♂, **Cuba** (*Poey*) (NAS).

Cuba: 3 ♂, Matanzas, v (AMNH, USNM); 1 ♂, Pinar del Rio (USNM); 1 ♂, [Havana] La Havane, 1908 (MNHN). **Bahamas**: 1 ♂, Nassau (BMNH). **U.S.A.**: 1 ♂, Florida, [Martin County,] Port Sewall (AMNH); 3 ♂, F., [Dade County,] Homestead, 2.ix.1958, 8.ii.1959 (AMNH, LACM, USNM); 4 ♂, 2 ♀, F., [Dade County,] Florida City, 21.iv, 2–5.v, 18.ix, 29.xi.1936, 1937, 1941 (AMNH, LACM); 1 ♂, F., [Dade County,] Biscayne Bay (AMNH); 1 ♂, F., [Dade County,] Royal Palm State Park (USNM); 1 ♂, F., Munroe County, Tavernier, 17.x.1955 (USNM); 1 ♂, 1 ♀, F., Munroe County, 18.ii.1960, 20.ix.1966 (LACM, USNM); 2 ♂, 'Florida' (USNM).

Halysidota ata sp. n.

(Figs 40–42, 87)

Halisidota cinctipes Grote 'Ab. 1' Hampson, 1901: 160.

Halisidota cinctipes Grote ab. *ata* Strand, 1919: 77. Holotype ♂, DOMINICAN REPUBLIC (BMNH) [examined]. [Infrasubspecific name.]

DESCRIPTION. ♂ and ♀. Forewing: ♂, 26–29 mm; ♀, 29–32 mm. As for *cinctipes* but distinguished by the lack of greenish blue areas on the thorax ventral to the eyes and forewings, and in the male by the longer spines (0·07 mm) on the lateral lobes of the tegumen and by the more heavily spinose vesica.

VARIATION. This occurs principally in the size of the discocellular marking which may be conspicuous as in the holotype or greatly reduced as in Figs 41, 42. The forewing ground-colour of most of the Dominican specimens is more greyish than that of the six Puerto Rican specimens examined.

STATUS. Strand (1919: 77) gave the infrasubspecific name *ata* to the specimen described by Hampson (1901: 160) as *H. cinctipes* Ab. 1. The name *ata* is here elevated to species-group rank and becomes *ata* Watson under Article 10(b) of the *Code*.

RELATIONSHIPS. (See *cinctipes*.) I have chosen to treat *ata* as a distinct species, not as a subspecies of *cinctipes*, because of the extent of the differences between these two taxa.

DISTRIBUTION. Known only from the Dominican Republic and Puerto Rico.

MATERIAL EXAMINED

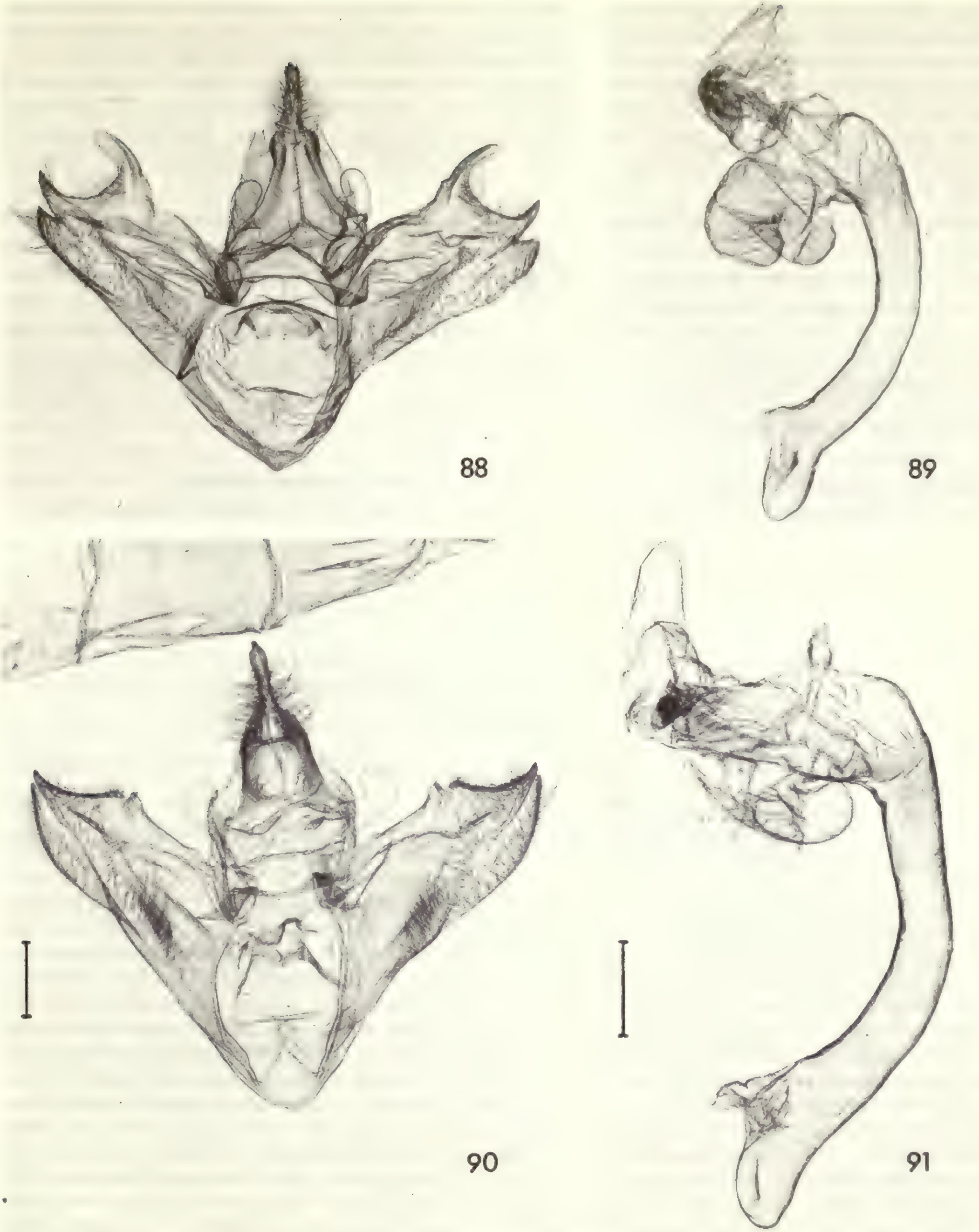
Holotype ♂, **Dominican Republic**: Santo Domingo (*Tweedie*) (BMNH).

Paratypes. **Dominican Republic**: 1 ♂, La Vega province, Hotel Montana, c. 520 m, 10 km NE. of Jarabacoa, 28.v.1973 (USNM); 1 ♂, 1 ♀, La Vega province, Constanza, 1164 m, Hotel Nueva Suiza, 29.v.1973 (USNM); 1 ♂, 1 ♀, La Estrelleta province, 4 km SE. of Rio Limpio, c. 760 m, 24–25.v.1973 (USNM); 7 ♂, 5 ♀, Dajabon province, 13 km S. of Loma de Cabrera, c. 400 m, 20–22.v.1973 (USNM); 1 ♂, 1 ♀, Convento, 12 km S. of Constanza, 6–13.vi.1969 (USNM); 1 ♀, Los Hidalgos, 4–5.vi.1969 (USNM); 2 ♀, El Seibo province, 15 km S. of Miches, c. 500 m, 31.v.1973 (USNM). **Puerto Rico**: 3 ♂, 1 ♀, Pico del Este, El Yunque Radar Station, 1000 m, 5–6.i.1971 (USNM); 1 ♂, Loquillo Exp. Forest, El Verde Field Station, 435 m, 1–21.i.1971 (USNM); 1 ♂, Laguna Guajataca, Boy Scout camp, 205 m, 2–5.iv.1971 (USNM).

Halysidota nigrilinea sp. n.

(Figs 45, 88, 89)

DESCRIPTION. ♂ and ♀. Forewing: ♂, 23–26 mm; ♀, 27 mm. Clypeofrons dark brown with some greyish white scales; vertex pale buff with some blue-green tipped scales dorsally. Basal segment of palp orange-yellow with distal border dark brown, or dark brown with anterior fringe orange-yellow; segment 2 a mixture of greyish white and dark brown scales (mostly greyish white) with dark brown bordered orange-yellow spot at middle laterally; apical segment greyish white with some dark brown scales. Antennal scape, pedicel and base of shaft orange-yellow; longest antennal pectination about 2·25 times diameter of shaft at that point. Patagia orange-buff with broad blue-green posterior border. Tegulae orange-buff bordered medially and posteriorly with blue-green and with black longitudinal streak at middle. Rest of thorax orange-yellow dorsally with blue-green mid-dorsal line; ventral surface orange-yellow with dark brown



Figs 88–91 *Halysidota* ♂ genitalia. (88, 89) *nigrilinea* paratype, CM slide, Bolivia. (90) *intensa*, LACM slide, Peru. (91) *intensa*, slide 2223, Ecuador.

area lateral and ventral to eye. Microtymbal number: 12. Outer surface of legs orange-yellow, inner surface pale yellow; markings a mixture of greyish white and black scales edged with black. Forewing pale buff; markings yellowish brown edged with dark brown, except in costal area where the fasciae are orange-yellow; veins marked with dark brown scales. Hind wing yellowish white, becoming more strongly yellowish at base, anally and at outer margin; small brown apical marking present. Under surface of wings as upper surface but paler and fasciae lack yellow costally. Abdomen orange-yellow dorsally, pale yellow ventrally.

♂ genitalia. Apical process of costa extends distal to that of sacculus; non-setose mid-costal process very large; setose process reduced to carina at base of non-setose process. Vincular lobes about twice as long as diameter at mid-point. Tegumen lobes moderately well developed; spines clearly visible at ×32 magnification. Vesica with scobinate bilobate anterior part and tapered posterior lobe, the latter with smaller scobinations than on anterior lobes. [The dorsal lobe of the anterior pair of lobes is tapered and extends to the right (away from the viewer) in Fig. 89 which is of a photograph taken from the morphological left-hand side.]

DIAGNOSIS. Probably likely to be confused only with the Argentinian *tucumanicola*, but the regular borders of the subterminal and terminal fascia contrast with the irregular lunulate borders of these fasciae in *tucumanicola*, and most specimens of *nigrilinea* have conspicuously marked veins where these cross the fasciae. *H. yapacaniae* has similarly large non-setose processes on the costal margin of the valve, an apomorphic character state which may link it with *nigrilinea*, but this hypothesis is not supported by overall similarity in colour-pattern, nor by other identifiable apomorphic characteristics.

DISTRIBUTION. Argentina and Bolivia.

MATERIAL EXAMINED

Holotype ♂, **Argentina**: Jujuy province, Yala, 1450 m, 20.ii.1955 (*Foerster*) (ZSBS).

Paratypes. **Argentina**: 17 ♂, 8 ♀, Jujuy province, Yala, 1450 m, 20.ii.1955 (Foerster) (ZSBS). **Bolivia**: 1 ♂, 1 ♀, Cochabamba (*Steinbach*) (CM).

Halysidota intensa Rothschild **nom. rev., stat. n.**

(Figs 43, 44, 90, 91)

Halisidota interlineata intensa Rothschild, 1909: 283. LECTOTYPE ♂, PERU (BMNH), here designated [examined].

Halisidota interlineata intensa Rothschild; [Rothschild,] 1911: pl. 11, figs 12, 13.

Halisidota interlineata ab. *subterminalis* Strand, 1919: 76. Holotype ♂, COSTA RICA (BMNH) [examined] [Infrasubspecific name.]

DESCRIPTION. ♂ and ♀. Forewing: ♂, 26–32 mm; ♀, 29–35 mm. Clypeofrons black; with few pale buff scales dorsomedially in few specimens. Vertex pale buff; dorsomedial scales tipped with bluish green. Palp black, speckled with greyish white; orange-yellow patch anteriorly at apex of segment 1 and laterally on segment 2 about two-thirds distance from base to apex. Antennal scape, pedicel and basal few segments of shaft orange-yellow; longest antennal pectination (♂) 1·50 to 1·75 times diameter of shaft at that point. Patagia pale buff with bluish green posterior band. Tegulae pale buff fringed medially with bluish green. Small black marking present or absent at middle of each tegula. Rest of thorax orange-yellow dorsally with bluish green mid-dorsal line; pale orange-yellow ventrally with dark brown area ventral to eye and in lateral band extending from a point ventral to anterior margin of patagia to below costal area of forewing base. Microtymbal number: 13 to 16. Outer surface of legs orange-yellow, inner surface pale yellow; markings black speckled with greyish white and edged with black. Forewing pale, slightly brownish yellow; markings pale yellowish brown, edged with black but a mixture of black and orange-yellow in costal area and in discocellular marking. Veins with black or dark brown scales where they intersect fasciae (especially noticeable in medial fascia and apical part of terminal fascia). Hind wing pale yellow or yellowish white, most intensely yellow anally, with single small brown apical marking. Under surface of wings as upper surface but paler, lacking orange-yellow scales, and with black scales replaced by dark brown; costal margin of hind wing with dark-edged yellowish brown marking at mid-point in some specimens. Abdomen orange-yellow dorsally, pale yellow ventrally; black spot or band present laterally on segments 3–8 (♂) or 3–6 (♀) and in some specimens a transverse black mid-ventral band or mid-ventral spot at posterior margin of segments 3 and 4.

♂ genitalia. Apical costal process of valve extending distal to apical process of sacculus. Non-setose mid-costal process continued distally as thin arcuate flange to base of apical process; setose process of costa partly enclosed by concavity formed near base of non-setose process. Vincular processes arcuate; length about twice as great as breadth at mid-point. Lobes of tegumen elongate, hardly expanded laterally; spines readily visible at × 32 magnification. Scobinate tapered anterior lobe of vesica with two accessory lobes on left-hand side, one towards its apex and equally strongly scobinate, another less heavily scobinate lobe near its base; elongate posterior lobe weakly scobinate; smaller unornamented digitate lobe on right-hand side of vesica.

VARIATION. The discocellular marking on the forewing of most specimens is connected to the costal element of the medial fascia, but is separate in a few specimens. Also variable individually is the completeness of the subterminal fascia which can be reduced even further than in Fig. 44 to three separate markings, or complete and unbroken; many specimens lack the subterminal marking between R_4 and R_5. A male, from Santo Domingo, Peru, has a terminal fascia composed of individual interneural spots. The presence or absence of a costal marking on the under surface of the hind wing and of mid-ventral abdominal markings has been mentioned in the description of *intensa*.

DIAGNOSIS. In South America, *intensa* is probably most likely to be confused with heavily marked *underwoodi* or with *pectenella* but can be separated by the generally less strongly convex outer margin of the forewing, the generally larger and darker discocellular markings on the forewing, by the male genitalia and (from *pectenella*) by the larger size. Distinguished from the smaller Central American *interlineata* by the presence on the forewing of at least one subterminal marking between the costal and anal markings. (The illustration in Seitz (1922: pl. 59) is inaccurate, especially in the subterminal area of the forewing, but gives a fair indication of the overall colour-pattern.)

STATUS. Travassos (1963: 476) incorrectly placed *interlineata intensa* in the synonymy of *tessellaris*. This placement is here corrected and the name *intensa* elevated to specific rank. Strand (1919: 76) gave the name ab. *subterminalis* (employed in an infrasubspecific sense) to Hampson's *H. interlineata* 'Ab. 1', a normally marked male specimen of *intensa* from Costa Rica.

DISTRIBUTION. Guatemala, Costa Rica, Honduras, Colombia, Venezuela, Ecuador, Peru and Bolivia.

MATERIAL EXAMINED

Halisidota interlineata intensa Rothschild, lectotype ♂, **Peru**: Carabaya, Rio Huacamayo, La Union, 2000 ft [610 m], wet season, xii.1904 (*Ockenden*) (BMNH). *Halisidota interlineata* ab. *subterminalis* Strand, holotype ♂, **Costa Rica**: Candelaria Mts (*Underwood*) (BMNH).

Guatemala: 2 ♂, Cayuga (LACM, MHNH). **Honduras**: 1 ♂, La Cambre (BMNH); 2 ♀, San Juancito (AMNH). **Costa Rica**: 2 ♂, 1 ♀, Tuis (BMNH, CM); 2 ♂, San José (BMNH, MNHN); 2 ♂, Asahar de Cartago, ii.1899 (BMNH) (paralectotypes of *H. intensa* Rothschild); 2 ♂, Puntarenas province, 4 miles [6·5 km] S. of San Vito, Las Cruces Field Station (OTS), 26–27.vi.1972 (LACM); 6 ♂, 5 ♀, 'Costa Rica' (BMNH, MNHN). **Colombia**: 4 ♂, 1 ♀, Upper Rio Negro, 800 m (BMNH); 1 ♂, Medina, 500 m (BMNH); 1 ♂, Cundinamarca, Monterredondo, 1420 m, 17.iii.1961 (ZSBS); 2 ♀, Cundinamarca, 3 km N. of Alban, Finca San Pablo, 1800 m (AMNH); 1 ♂, 2 ♀, Don Amo, 2000 ft [610 m] (BMNH); 1 ♂, Mocoa, 530 m, 20–30.v.1922 (ZSBS); 1 ♂, Muzo, 400–800 m (BMNH). 2 ♀, 'Colombia' (AMNH). **Venezuela**: 2 ♀, Mérida (BMNH) (paralectotypes of *intensa*); 1 ♂, 1 ♀, Caracas (BMNH); 1 ♂, San Esteban, vii.1909 (BMNH); 1 ♂, La Puerta, 1250 m, 12.ii.1953 (USNM); 1 ♀, Aragua, Rancho Grande, 1100 m, 2.xi.1951, 2.viii.1962 (Toulgoët Coll.); 1 ♂, 1 ♀, Cucuta (BMNH); 6 ♂, 2 ♀, near St Esteban, Las Quigas (BMNH, CM). **Ecuador**: 1 ♂, Tinlandia, Route Santo Domingo, I.G. Quito km 16, Pichincha, 650 m, 19–22.i.1975 (Toulgoët Coll.); 1 ♀, Santo Domingo, Pichincha, 750 m, 18–19.iv.1977 (BMNH); 1 ♂, West, Napo, Lumbaqui, Texaco station, 850 m, 4–5.xi.1975 (BMNH); 1 ♀, 'Ecuador' (AMNH). **Peru**: 5 ♂, south-east, Carabaya, Santo Domingo, 6000 ft [1830 m], dry season, vi.1902 (BMNH); 1 ♂, 2 ♀, south-east, Carabaya, Santo Domingo, 6500 ft [1980 m], wet season, xi.1902, i.1903 (BMNH) (paralectotypes of *intensa*); 1 ♂, Tingo Maria, 29.i.1950 (USNM); 2 ♀, northern, Tabaconas River, 6000 ft [1830 m], 1912 (BMNH); 1 ♂, Navai Tachera, iv.1971 (Toulgoët Coll.); 1 ♂, Dept. Pasco, 22 km SE. of Iscozazin, Chontilla, 10.vii.1961 (LACM); 4 ♂, 5 ♀, Northern, Upper Maranon, Rentema Falls, 1000 ft [300 m] (BMNH); 1 ♀, Inambari River, 1918 (BMNH); 1 ♂, Yahuarmayo, 1200 ft [370 m], v–vii.1912 (BMNH). **Bolivia**: 1 ♂, 1 ♀, Rio Songo, 750 m (BMNH).

(The few paralectotypes of *H. intensa* listed represent all those which could be identified as such with certainty from a possible 17 ♂ and 10 ♀.)

Halysidota interlineata Walker

(Figs 46, 92, 93)

Halesidota interlineata Walker, 1855: 739. LECTOTYPE ♀, BRAZIL (BMNH), here designated [examined].
Phegoptera jucunda Herrich-Schäffer, [1855]: fig. 285 (wrapper). LECTOTYPE ♂, BRAZIL (MNHU), here designated [examined].
Halesidota interlineata Walker; Herrich-Schäffer, 1858: 81 (synonymy of *H. jucunda* with *H. interlineata*).

DESCRIPTION. ♂ and ♀. Forewing: ♂, 20–23 mm; ♀, 23–27 mm. Clypeofrons dark brown, vertex pale buff. Palp dark brown speckled with white anteriorly; basal segment yellow apically; second segment with small yellow lateral spot in some specimens just distal to mid-point. Antenna orange-yellow from base to about segment 20, brown to about segment 30, then yellow to near apex in most specimens; longest antennal pectination 1·5 times diameter of shaft at that point. Patagia pale buff, fringed posteromedially with greyish green. Tegulae pale buff fringed medially with greyish green; usually without markings but may have small black streak in middle towards anterior margin. Rest of thorax orange-yellow dorsally with greyish green mid-dorsal line; orange-yellow ventrally, with dark brown area from eye to base of forewing. Outer surface of legs orange-yellow, inner surface pale buff; markings a mixture of greyish white and black, edged with black. Microtymbal number: 11 to 13. Forewing pale buff above, markings yellowish brown edged with black, but costal and discocellular markings a mixture of orange-yellow and black. Subterminal fascia absent (rarely) or represented by a costal and an anal marking (most specimens) or by only one of these markings. Terminal fascia unicolorous, veins not emphasized by darker scales. Under surface of forewing as upper surface, but markings less distinct and orange-yellow coloration absent. Hindwing pale yellow; upper surface becoming orange-yellow anally and at outer margin; small brown apical marking present in a few specimens. Abdomen orange-yellow dorsally, pale buff ventrally; black lateral spots or dashes present on segments 3 to 8 (♂) or 3 to 6 (♀).

♂ genitalia. Apical saccular process of valve extending distal to apical costal process; the latter dilate preapically; non-setose mid-costal process large and angulate; setose costal process small. Vincular lobes arcuate; length about three to four times least diameter. Lateral lobes of tegumen weakly developed; spines barely visible at ×80 magnification. Anterior lobe of vesica scobinate apically, with small scobinate accessory lobe on left-hand side near apex. Two non-scobinate lobes at base of anterior lobe: one directed dorsally, the other ventrally. Tapered posterior lobe of vesica weakly scobinate.

VARIATION. The examined specimens are fairly uniform in coloration and colour-pattern. Apart from the already described variation of the subterminal fascia, the only noticeable difference in colour-pattern between specimens is exhibited in the medial fascia of the forewing which is extended proximally as a narrow black line along the anal margin of the wing in a few specimens.

DIAGNOSIS. In coloration and colour-pattern this species is similar to *pectenella* but lacks subterminal markings except at costa and anal margin, has a larger darker discocellular marking, and a unicolorous terminal fascia unlike most specimens of *pectenella*. Specimens of *intensa* with a poorly marked subterminal fascia could be mistaken for *interlineata* but generally have a less strongly arcuate outer margin to the forewing than in *interlineata* and have dark-coloured veins crossing the terminal fascia. The male genitalia of both *pectenella* and *intensa* differ in several respects from those of *interlineata*.

FOODPLANTS. Lima (1949: 224) reported 'amoreira' [*Morus*] as a foodplant in Brazil. He recorded the duration of the larval stage as 40 days, and of the pupal stage also as 40 days.

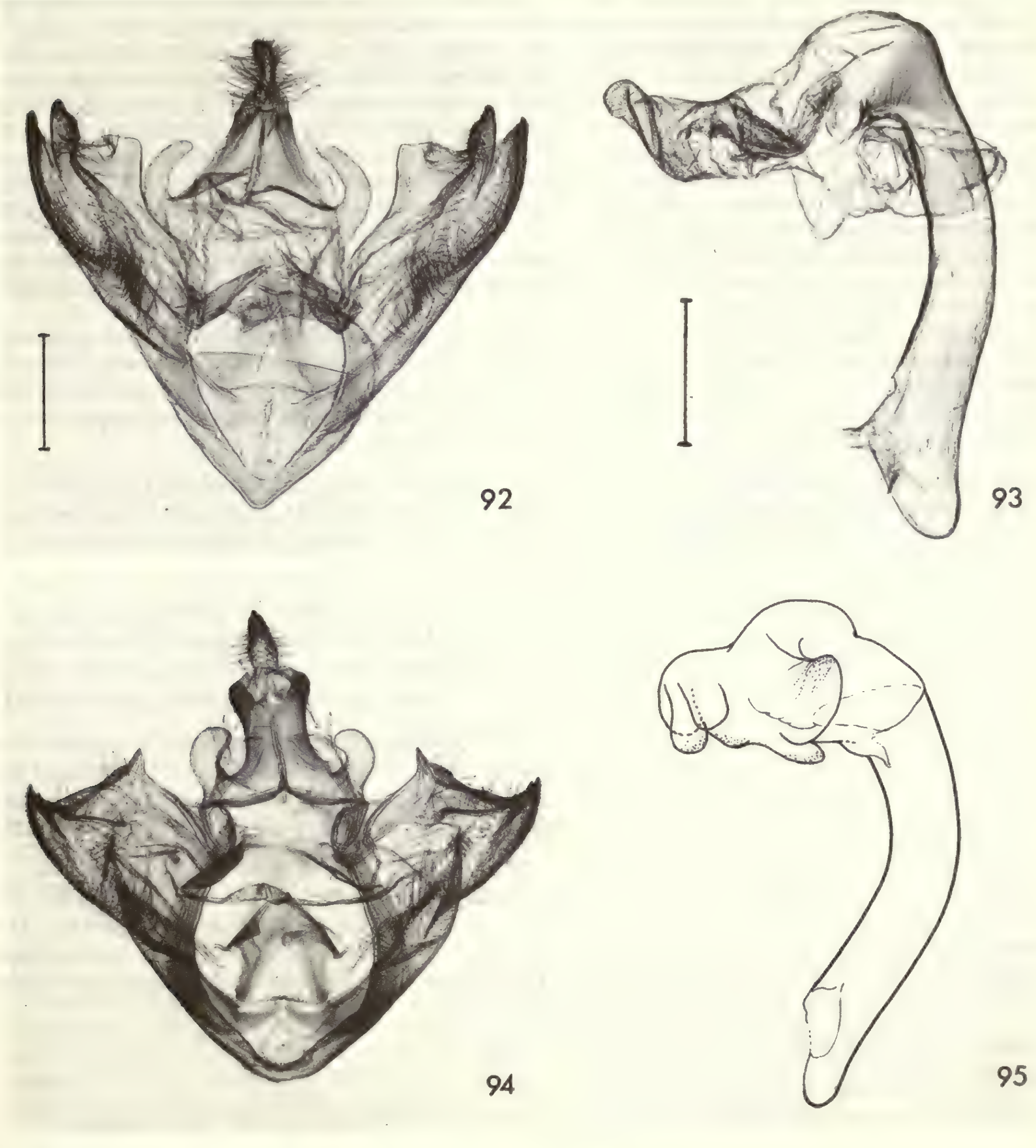
DISTRIBUTION. I have examined specimens from Guatemala southwards to southern Uruguay, but Travassos (1963: 486) includes Mexican material (Oaxaca) in his list of studied material. Kimball (1965: 75) suggests that an earlier record from Florida of *interlineata* was probably based on a misidentification of *cinctipes*.

MATERIAL EXAMINED

Halesidota interlineata Walker, lectotype ♀, **Brazil**: (? Bras) (BMNH). *Phegoptera jucunda* Herrich-Schäffer, lectotype ♂, **Brazil** (MNHU).

Guatemala: 1 ♀, Izabal, Ruinas de Quiriguá, 24–25.viii.1974 (LACM); 3 ♂, 2 ♀, Cayuga (CM, BMNH, USNM). **Belize**: 1 ♂, 2 ♀, Rio Grande (BMNH); 1 ♂, 'Brit. Honduras'. **Panama**: 4 ♂, Canal Zone, Barro Colorado Island, 14.iii.–20.v, 1941–1964 (AMNH, USNM); 1 ♂, 'Panama' (USNM). **Colombia**: 1 ♂, Rio

Negro, 800 m (BMNH). **Venezuela**: 1 ♂, San Esteban, Las Quiguas (BMNH); 1 ♂, Aroa (USNM); 1 ♂, Mérida (BMNH); 1 ♂, Miranda, Parque Nac. Guatopo, La Macanilla, 500 m, 8.v.1975 (UCV); 1 ♂, Aragua, La Isleta, Choroni, 200 m, 14.vii.1975 (UCV); 1 ♂, Aragua, Rancho Grande, 12.vii.–16.viii.1976 (BMNH). **Surinam**: 1 ♀, 'Surinam' (BMNH). **French Guiana**: 2 ♂, 5 ♀, Cayenne, 1875 (BMNH, MNHN); 3 ♂, 9 ♀, Guyane française (BMNH). **Brazil**: 1 ♂, Pará (BMNH); 2 ♂, 1 ♀, Rio de Janeiro, 22.viii.1912 (BMNH, MNHN); 2 ♂, São Paulo, Alto de Serra, vi.1926 (BMNH); 1 ♂, Sta Catarina, Marumbi, 16.x.1966 (BMNH); 1 ♂, Rio State, Terezopolis, Barreira, 350 m, 30.x.1931 (BMNH); 1 ♀, Rio State, Soperbo, 900 m, 28–29.x.1951 (BMNH); 1 ♀, [Rio State,] Municipio de Magé, Guapimirim, 5–6.ix.1959 (BMNH); 2 ♂, Brazil (MNHN). **Uruguay**: 1 ♀, Montevideo (BMNH).



Figs 92–95 *Halysidota* ♂ genitalia. (92) *interlineata*, slide 2343, São Paulo. (93) *interlineata*, UCV slide, Venezuela. (94) *fumosa*, LACM slide, Costa Rica, near Rincon. (95) *fumosa*, LACM slide, Costa Rica, Orosi.

Halysidota fumosa Schaus **nom. rev., stat. n.**

(Figs 47, 94, 95)

Halisidota cinctipes fumosa Schaus, 1912: 38. Lectotype ♂, Costa rica (BMNH) [examined] (designated by Watson, 1971: 37).

Description. ♂ and ♀. Forewing: ♂, 24–28 mm; ♀, 28 mm. Clypeofrons either completely black, or black dorsally and laterally but otherwise brownish grey; vertex brownish buff. Palp black except for grey anterior fringe to basal segment. Scape, pedicel and basal few segments of antennal shaft orange-yellow, remainder unscaled. Longest antennal pectination about 2·5 times diameter of shaft at that point. Patagia light brown, with trace of greyish blue-green posteromedially. Tegulae light brown with conspicuous black longitudinal stripe; each fringed laterally with orange-yellow, and medially with hair-scales that are buff proximally and greyish blue-green distally. Rest of dorsal surface of thorax orange-yellow with greenish grey mid-dorsal line and grey posteromedial margin. Ventral and lateral surfaces of thorax orange-yellow, with black band extending from eye to base of forewing on each side. Microtymbal number: 12–13. Outer surface of legs orange-yellow, inner surface pale buff; markings either black or black speckled with grey. Forewing pale buff or brownish buff above; markings chiefly brown or greyish brown intersected by dark brown veins and edged with black; discocellular and costal markings orange-yellow and more heavily edged with black. Under surface of forewing as upper, but markings less well defined and fascia uniformly greyish brown except for trace of yellow in discocellular marking. Hindwing becoming orange-yellow anally, pale greyish brown with brown apical marking or markings, continued as brown band along outer margin in some specimens. Abdomen orange-yellow dorsally, greyish buff ventrally; black segmental lateral dashes on segments 3 to 8 (♂) or 3 to 6 (♀) and with black transverse mid-ventral spots or bands in some specimens, the latter forming continuous broad mid-ventral black band in one female examined.

♂ genitalia. Apical saccular process of valve extending distal to apical costal process; both acuminate. Non-setose mid-costal process concave medially; setose process present as carina at base of former. Vincular processes robust, arcuate; about twice as long as diameter at mid-point. Tegumen distinctively broader posteriorly; spines of lateral lobes just visible at ×32 magnification. Uncus short, approximately pyriform in shape. Middle of three distal lobes of vesica scobinate.

Variation. An Ecuadorian male (BMNH) has darker hind wings and forewing fasciae than in the illustrated example, lacks subterminal markings between veins M_3 and CuP on the forewing and lacks the antemedial marking at the anal margin of the forewing. Variation in the extent of the hind wing and abdominal markings are mentioned in the description.

Diagnosis. Externally likely to be confused with small dark examples of *underwoodi*, but lacks yellow on the basal segment of the palp and has a less distinctly arcuate discocellular marking. Identification of males can be confirmed by an examination of the uncus which is usually visible dorsally in set specimens. The tegumen and vesica in the male genitalia are also highly diagnostic.

Status. The name *fumosa* was established as a subspecific name and subsequently relegated to infrasubspecific rank by Seitz (1922: 412) as 'ab. *fumosa*'. Travassos (1963: 476) reinstated the name as *Halisidota cinctipes fumosa* Schaus and at the same time placed it incorrectly in the synonymy of *tessellaris*. Travassos's error is here corrected and *fumosa* is recognized as the name of a distinct species.

Lectotype. The original syntypic series of *fumosa* probably comprised two specimens: the specimen subsequently selected as lectotype and another male from Juan Viñas, Costa Rica. The latter specimen (Fig. 47) was not located by the author in 1971 (Watson, 1971: 37) but has been traced subsequently. The lectotype is the only specimen which had been labelled previously in the USNM collection with a red 'Type' label.

Distribution. Costa Rica, Colombia and Ecuador.

Material examined

Halisidota cinctipes fumosa Schaus, lectotype ♂, **Costa Rica**: Sixola R., iii (USNM) [examined].

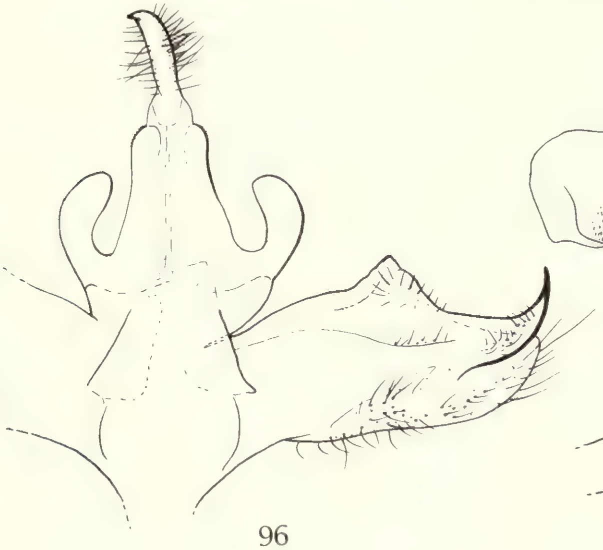
Costa Rica: 1 ♂, Juan Viñas, vi (USNM) (paralectotype of *fumosa*); 1 ♂, Vulkan Irazu, Orosi, 1200 m (BMNH); 2 ♂, 1 ♀, Puntarenas province, Osa Peninsula, 1·8 miles [2·9 km] W. of Rincon, 5, 21, 22.ii.1971 (LACM). **Colombia**: 1 ♂, Cali (MNHN). **Ecuador**: 2 ♂, 1 ♀, St Domingo, Pichincha, 750 m, 18–19.iv.1977 (BMNH); 1 ♀, Tinlandia, [near] Santo Domingo, 700 m, 16–19.vi.1977 (ZSBS).

Halysidota masoni (Schaus)

(Figs 48, 96, 97)

Phaegoptera masoni Schaus, 1895: 29. Lectotype ♀, MEXICO (USNM) [examined] (designated by Watson, 1971: 57).
Halisidota masoni (Schaus); Hampson, 1901: 162.
Halisidota masoni (Schaus); Seitz, 1922: 413, pl. 59, row g [good illustration].

DESCRIPTION. ♂ and ♀. Forewing: ♂, 35 mm; ♀, 32–37 mm. Head orange-yellow, with or without small dark brown patch on each side of clypeofrons. Basal segment of palp orange-yellow, segment 2 black with orange-yellow posterolateral patch, segment 3 black. Antennae orange-yellow basally to segment 3 of shaft, dark brown to mid-point, then unscaled. Longest antennal pectination twice (♂) or 1·75 (♀) times diameter of shaft at that point. Patagia orange-yellow, without markings; tegulae orange-yellow, each with black spot anterolaterally; rest of thorax orange-yellow. Microtymbal number: 13. Coxa and trochanter of foreleg orange-yellow; femur mainly orange-yellow, but black distally; tibia and tarsus black. Mesothoracic and metathoracic legs similar, but mesothoracic femur may have a black spot towards distal end of outer surface and tibiae of both legs may possess an orange-yellow patch proximally. Forewing orange-yellow above with yellowish grey-white, black-edged marking. Distal to discocellular marking a black subterminal line (incomplete in costal half of wing in some specimens) is edged distally with yellowish grey-white; rest of distal part of wing pale orange-yellow with black veins. Colour-pattern of ventral surface of forewing as upper surface, but fascia completely dark brown and subterminal line edged distally with dark brown. Hind wing pale orange-yellow. Abdomen orange-yellow with black lateral and posteroventral markings on segments 3–8 (♂) or 3–6 (♀).



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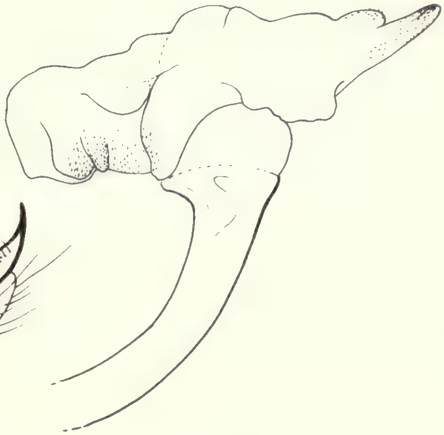

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Figs 96, 97 *Halysidota masoni* ♂ genitalia, slide 2346.

♂ genitalia. Apical costal process of valve extending distal to apex of sacculus; non-setose process of costa angulate apically, weakly concave dorsally; setose process not well-differentiated but present as weak ridge along distal margin of non-setose process. Vincular process about three times as long as least diameter. Lobes of tegumen well-developed; spines just visible at × 32 magnification. Anterior lobe of vesica with small preapical lobe on left-hand side and two further lobes at base.

DIAGNOSIS AND AFFINITIES. Readily separable from the rest of its group by the rich orange-yellow ground colour and the nearly white fasciae of the forewing, and by the absence of a terminal fascia. *H. masoni* lacks blue-green fringes to the tegulae and patagia (as *elota* and *leda*) and lacks a mid-dorsal line on the thorax (as *leda*).

The sister-species of *masoni* may not exist today, but its sister-group may comprise the other 26 externally homogeneous species of Subgroup A (see 'Phylogeny', p. 3).

DISTRIBUTION. Mexico.

MATERIAL EXAMINED

Phaegoptera masoni Schaus, lectotype ♀, **Mexico**: Jalapa (USNM) [examined].

Mexico: 1 ♀, Vera Cruz state, Huatuxco (BMNH); 1 ♂, [Vera Cruz state,] Orizaba (BMNH); 1 ♀, [Morelos state,] Cuernavaca (BMNH); 1 ♂, [Morelos state,] [Cuernavaca] Quernavaca, vi.1939 (ZSBS); 1 ♂, 1 ♀, 'Juxpan' (ZSBS).

Halysidota elota (Möschler) **comb. rev.**

(Figs 98–101)

Halesidota elota Möschler, 1886: 33, fig. 29. Holotype ♀, JAMAICA (MNHU) [examined].
Euhalisidota elota (Möschler); Kirby, 1892: 209.
Opharus elota (Möschler); Seitz, 1922: 400, pl. 57, row e [poor fig.].

DESCRIPTION. ♂ and ♀. Forewing: ♂, 30–34 mm; ♀, 30–33 mm. Clypeofrons black, vertex greyish yellow. Palp black, with orange-yellow apical band on basal segment and orange-yellow antero-apical patch on segment 2. Scape of antenna orange-yellow, with black ventral patch; pedicel orange-yellow dorsally, brown ventrally; flagellum brown; longest antennal pectination three times (♂) or twice (♀) diameter of shaft at that point. Patagia greyish yellow, darkest posteriorly; tegulae greyish yellow, fringed medially with greyish brown, without markings. Rest of thorax orange-yellow dorsally, with greyish brown mid-dorsal line; ventrally orange-yellow with dark brown band extending from ventral to eyes to base of hind wing. Microtymbal number: 11. Outer surface of legs orange-yellow, inner surface pale yellow; banded and spotted with black. Forewing brownish orange-yellow banded with yellowish brown, and with darker brown anal margin; black basal spot present; discocellular marking weak. Hind wing pale orange-yellow with one or more yellowish brown apical markings. Under surface of wings similar, or with markings more clearly defined than on upper surface. Abdomen orange-yellow dorsally, pale yellow ventrally; with lateral row of black spots on each side of segments 3–8 (♂) or 3–6 (♀).

♂ genitalia (Figs 99, 100). Shoulders of tegumen scobinate; scobinations just visible at ×32 magnification. Left-hand lobe of vesica scobinate, right-hand lobe spinose.

♀ genitalia (Fig. 98). Anterior apophyses about twice length of posterior apophyses. Corpus bursae armed with rows of inwardly directed spines (readily discernible at ×80 magnification).

DIAGNOSIS. See 'Phylogeny' (p. 4).

REMARKS. The holotype is almost devoid of colour-pattern, which probably accounts for the fact that *elota* has not been associated with the *tessellaris*-group hitherto.

DISTRIBUTION. Known only from Jamaica.

MATERIAL EXAMINED

Halesidota elota Möschler, holotype ♀, **Jamaica** (MNHU).

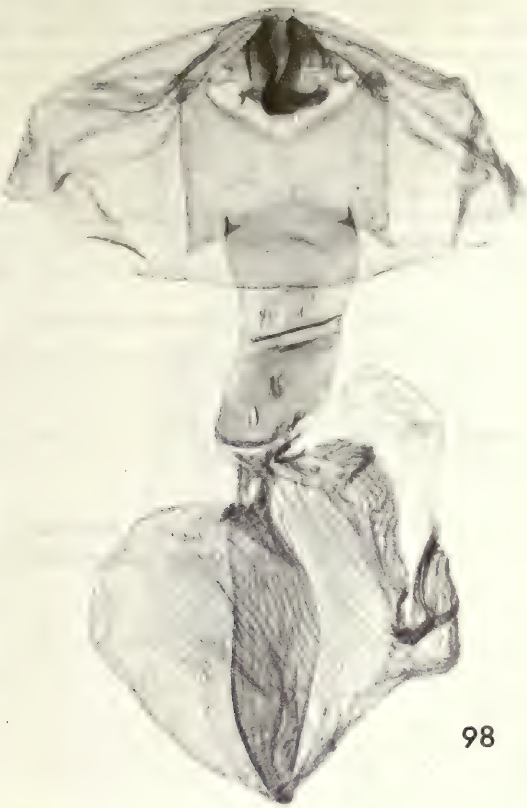
Jamaica: 2 ♀, Newcastle; 2 ♂, Cinchona iv.–v.1891, 2.i.1899; 1 ♀, Oracabessa; 1 ♀, Portland Parish, 1 mile [1·6 km] N. of Hardware Gap, 12–20.xi.1966; 1 ♀, St Ann; 2 ♂, 3 ♀, 'Jamaica'. (All examples in BMNH.)

Halysidota leda (Druce)

(Figs 102–106)

Phoegoptera leda Druce, 1890: 497.

DESCRIPTION. ♂ and ♀. Forewing: ♂, 31–36 mm; ♀, 37–41 mm. Head brownish yellow, with black lateral spot at each side of clypeofrons. Basal segment of palp black proximally, brownish yellow distally; segments 2 and 3 black with brownish orange anterodistal patch. Antenna brownish yellow; longest antennal pectination twice (♂) or equal to (♀) diameter of shaft at that point. Patagia and tegulae brownish yellow or orange; each tegula with black spot anterolaterally. Rest of thorax brownish yellow or orange except for black lateral band extending from eye to base of hind wing. Legs orange-yellow, darkest on outer surface;



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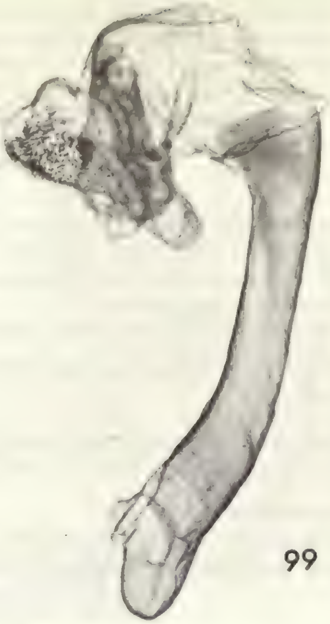

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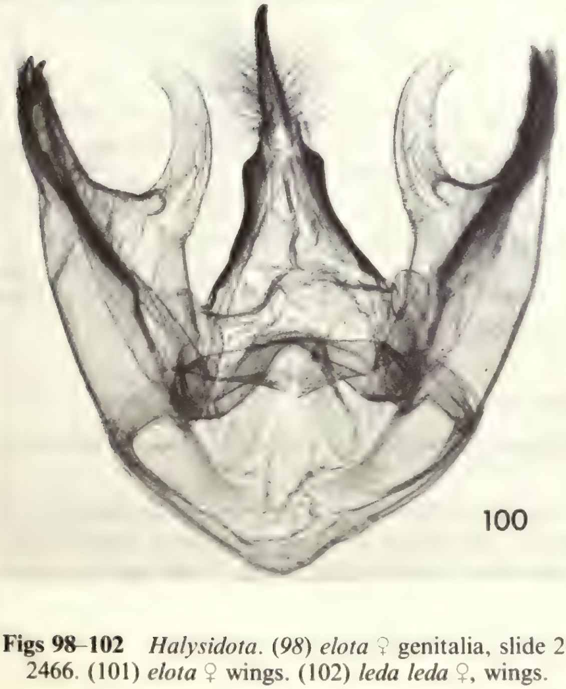

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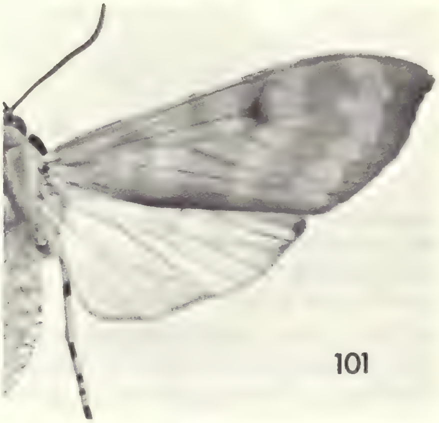

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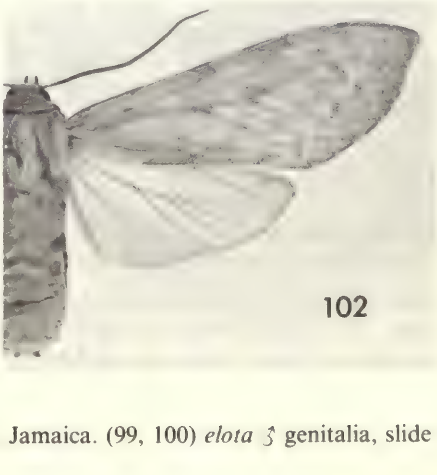

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Figs 98–102 *Halysidota*. (*98*) *elota* ♀ genitalia, slide 2472, Jamaica. (99, 100) *elota* ♂ genitalia, slide 2466. (101) *elota* ♀ wings. (102) *leda leda* ♀, wings.

markings black. Microtymbal number: 19–20. Upper surface of forewing brownish orange. Markings poorly defined (absent except at costa in *leda enricoi*), composed of scattered black scales; trace of sub-basal and antemedial fasciae, less weakly marked medial and postmedial fasciae; subterminal fascia either concolorous or represented by two parallel, dentate lines; terminal fascia absent, represented either by a few black scales or pale yellowish brown edged with black scales. Hind wing brownish yellow, transparent except at margins; with few black scales apically in some specimens. Under surface of wings a more brownish yellow than upper surface; markings more clearly marked distal to cell, absent or hardly visible proximad. Abdomen brownish orange dorsally, pale brownish yellow ventrally; black spot laterally on each side of sternites 3–7 (♂), 3–5 (♀ of *leda leda*) or 3–6 (♀ of *leda enricoi*).

♂ genitalia (Figs 104–106). Apical saccular process of valve extends distally beyond apical costal process; setose process of costa longer than non-setose process. Tegumen broad, shoulders spinose. Lobes of vesica as in illustration; scobinate on ventral surface of two proximal anterior lobes and on morphologically right-hand surface of rest of vesica.

♀ genitalia (Fig. 103). Pre-ostial plate tapered and falcate postero-laterally; appendix bursae large.

DIAGNOSIS. The colour-pattern readily distinguishes *leda* from all other species of *Halysidota* sensu stricto.

DISTRIBUTION. Known only from the Windward Islands: *leda leda* from Dominica and Guadeloupe, and *leda enricoi* from Martinique.

Key to subspecies

Forewing fasciae distinct; dorsal surface of thorax brownish yellow	***leda leda*** (p. 60)
Forewing fasciae absent or represented only at costa; dorsal surface of thorax orange	***leda enricoi*** (p. 60)

Halysidota leda leda (Druce)

(Figs 102–106)

Phoegoptera leda Druce, 1890: 497, LECTOTYPE ♀, WINDWARD ISLANDS: Dominica (BMNH), here designated [examined].
Euhalisidota leda (Druce); Kirby, 1892: 209.
Halisidota leda (Druce); Hampson, 1901: 170.

DIAGNOSIS. The nominate subspecies differs from *leda enricoi* in the fasciate forewings, the brownish yellow dorsal surface of the thorax, the smaller black spot (less than 1 mm in diameter) on each patagium and by the smaller lateral spots on the abdomen.

MATERIAL EXAMINED

Phoegoptera leda Druce, lectotype ♀, **Windward Islands**: Dominica (*Angas*) (BMNH).

Windward Islands: 1 ♂, Dominica, 1905 (BMNH); 1 ♂, 1 ♀, 4 miles [6·2 km] E. of Pont Casse, 12–23.vi.1964 (BMNH, presented by USNM); 1 ♂, 1 ♀, Guadeloupe, Mamelle du Pt Bourg, 530 m, 9–12.vi.1978 (BMNH, presented by Count H. de Toulgoët).

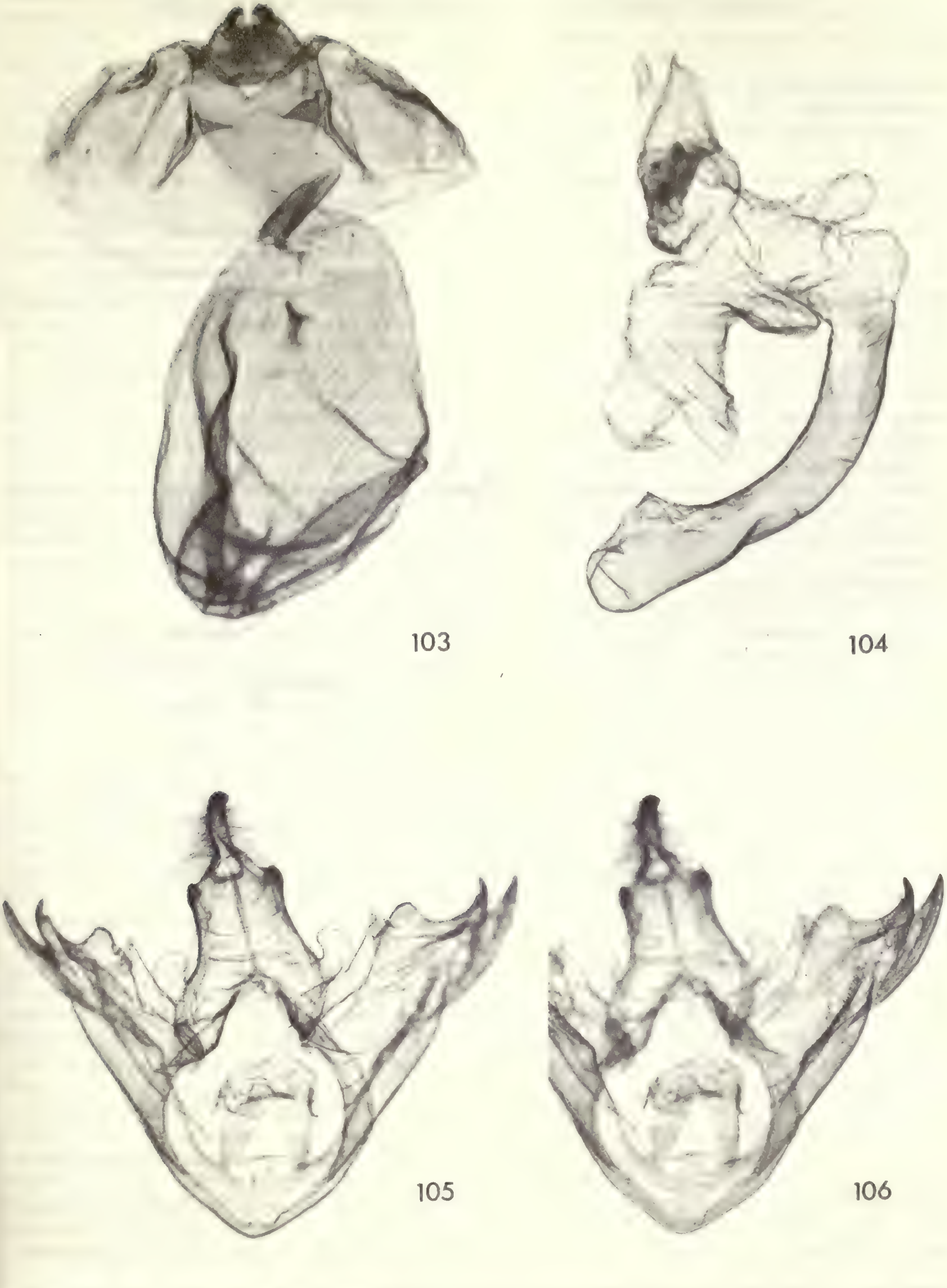
Halysidota leda enricoi Toulgoët

Halysidota leda enricoi Toulgoët, 1978: 377, Holotype ♂, WINDWARD ISLANDS: Martinique, Morne vert, v.1967 (*Enrico*) (MNHN) [not examined].

DIAGNOSIS. Separable from *leda leda* by the almost complete absence of transverse fasciae on the wings, the orange dorsal surface of the thorax, the larger black spot (greater than 1 mm in diameter) on each patagium, and by the larger black lateral spots on the abdomen.

MATERIAL EXAMINED

Windward Islands: 1 ♀, Martinique, Morne vert, v. 1967 (BMNH); 1 ♀, Martinique, Fort de France, Balata, 10.xii.1966 (BMNH). (Both specimens presented by Count H. de Toulgoët.)



Figs 103–106 *Halysidota leda leda* genitalia. (103) ♀, slide 2474, Dominica. (104–106) ♂, slide 2475, Dominica.

Systematic checklist of *Halysidota* Hübner sensu stricto

This list follows the sequence of species adopted in the preceding text.

- ***HALYSIDOTA*** Hübner, [1819]
  - ***tessellaris*** (Smith, 1797)
    - *antiphola* Walsh, 1864
    - *oslari* Rothschild, 1909 **syn. n.**
    - *antipholella* Strand, 1919 (infrasubspecific name)
    - *tesselaroides* Strand, 1919 (infrasubspecific name)
  - ***harrisii*** Walsh, 1864 **sp. rev.**
  - ***meridionalis*** Rothschild, 1909 **nom. rev., stat. n.**
  - ***insularis*** Rothschild, 1909 **nom. rev., stat. n.**
  - ***ruscheweyhi*** Dyar, 1912 **nom. rev., stat. n.**
  - ***davisii*** Edwards, 1875
  - ***schausi*** Rothschild, 1909 **sp. rev.**
    - *pallida* Rothschild, 1909 (junior homonym)
    - *mexiconis* Strand, 1919 (replacement name) **syn. n.**
  - ***brasiliensis*** Rothschild, 1909 **nom. rev., stat. n.**
  - ***yapacaniae*** **sp. n.**
  - ***tucumanicola*** Strand, 1919 **nom. rev., stat n.** (replacement name)
    - *tucumana* Rothschild, 1909 (junior homonym)
  - ***pearsoni*** **sp. n.**
  - ***steinbachi*** Rothschild, 1909 **sp. rev.**
  - ***fuliginosa*** Rothschild, 1909 **sp. rev.**
    - *carinator* Dyar, 1912, **syn. n.**
    - *meta* Strand, 1919 (infrasubspecific name)
  - ***orientalis*** Rothschild, 1909 **nom. rev., stat. n.**
    - *modalis* Dyar, 1912 **syn. n.**
  - ***conflua*** **sp. n.**
  - ***underwoodi*** Rothschild, 1909 **sp. rev.**
    - *bricenoi* Rothschild, 1909 **syn. n.**
    - *meridensis* Rothschild, 1909 **syn. n.**
    - *lucia* Strand, 1919 (infrasubspecific name)
  - ***pectenella*** **sp. n.**
  - ***atra atra*** Druce, 1884
  - ***atra rindgei*** **subsp. n.**
  - ***instabilis*** Dyar, 1912 **stat. n.**
  - ***donahuei*** **sp. n.**
  - ***cinctipes*** Grote, 1865 **sp. rev.**
  - ***ata*** **sp. n.**
    - *ata* Strand, 1919 (infrasubspecific name)
  - ***nigrilinea*** **sp. n.**
  - ***intensa*** Rothschild, 1909 **nom. rev., stat. n.**
    - *subterminalis* Strand, 1919 (infrasubspecific name)
  - ***interlineata*** Walker, 1855
    - *jucunda* (Herrich-Schäffer, [1855])
  - ***fumosa*** Schaus, 1912 **nom. rev., stat. n.**
  - ***masoni*** (Schaus, 1895)
  - ***elota*** Möschler, 1886 **comb. rev.**
  - ***leda leda*** (Druce, 1890)
  - ***leda enricoi*** Toulgoët, 1978

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A review of the African Phaneropterinae with open tympana (Orthoptera: Tettigoniidae)

D. R. Ragge

Entomology series Vol 40 No 2 24 April 1980

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A review of the African Phaneropterinae with open tympana (Orthoptera: Tettigoniidae)

D. R. Ragge

Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD

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Synopsis

The 41 African and Arabian genera of Phaneropterinae with open tympana are reviewed and a key is provided for their identification. Seven of these genera are new and six (*Ivensia, Peropyrrhicia, Dioncomena, Eulioptera, Parapyrrhicia* and *Monteiroa*) are fully revised with keys to the species. Thirty-three new species and one new subspecies are described. Three new generic synonyms, six new specific synonyms and eight new combinations are established. Accounts are given of the biology, economic importance and biogeography of the group, and of the inter-relationships of the genera. A check-list is given of all the genera and species, including synonyms.

Introduction

It is just over a century since Brunner (1878) monographed the world Phaneropterinae, which then comprised 112 genera. There are now this number of nominal genera in the African Phaneropterinae alone, and a world monograph is no longer a feasible proposition. In order to keep even the present review to a manageable size I have confined it to the 41 African and Arabian genera in which both the outer and inner fore tibial tympana are openly exposed, together with the single genus *Diogena*, which has auriculate tympana but is clearly a close relative of two African genera with open tympana. As discussed on p. 70 I am using the nature of the fore tibial tympana purely as a convenient and easily seen character for a broad subdivision of the subfamily and am not pretending that the resulting groups are 'natural' ones.

The geographical region embraced by this review is the same as that used for my 1968 catalogue; it includes the whole of the African mainland and 'off-shore' islands (e.g. Socotra, Zanzibar and the islands of the Gulf of Guinea) and the Arabian Peninsula, but excludes the Malagasy Sub-region, in which the Phaneropterinae are almost entirely endemic. Throughout

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the text I have used the term 'Afrotropical Region' in preference to, and with the same meaning as, Sclater's 'Ethiopian Region' (see Crosskey & White, 1977).

One African genus with open tympana, *Pseudopyrrhizia* Brunner, I have been unable to identify. It was based on the unique female holotype of *P. punctata* Brunner from 'Zanzibar' (Brunner, 1891: 110), which was originally in the Naturhistorisches Museum, Vienna, but which Dr A. Kaltenbach tells me has been missing for a long time. It is impossible to be certain of the identity of this specimen from the original description and so the generic and specific names must remain as nomina dubia, at least for the time being.

As a result of new nomenclatural changes in this review, the genera *Leptophyes* Fieber, *Himertula* Uvarov and *Letana* Walker are no longer represented in Africa (see pp. 113, 132 and 163), the first becoming exclusively Palaearctic and the other two exclusively Oriental.

As is well known to students of Africa there have been many changes in the names of its countries, towns and islands during recent years, so that the names given on the locality labels of African insect specimens are frequently obsolete. My standard policy in this review has been to give only the names in current use when citing the localities of material examined. However, in the case of holotypes bearing obsolete locality names I have cited both the current names and those appearing on the labels; I have also done this in a few other cases where the name-change has been particularly recent.

Acknowledgements

I should first like to express my appreciation of the kindness of my late friend and colleague Dr Harold J. Grant, who made available to me the rich collection of African Phaneropterinae in the Academy of Natural Sciences of Philadelphia. It was Dr Grant's intention to revise the Neotropical Phaneropterinae, a project closely parallel to the present review, and it is much to be regretted that this study was brought to an end by his untimely death.

I am particularly indebted to my colleague Mr J. Huxley, who helped me greatly during a preliminary survey of the African Phaneropterinae in the early stages of this study.

I am also most grateful to the following specialists, who have been kind enough to lend me type-specimens or other material from their respective institutions:

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I am much indebted to Mr P. H. Ward, who has exercised great care and skill in producing the drawings of whole insects that embellish this review. I am also very grateful to Mr W. J. Reynolds, who kindly tested the key to genera and thus enabled me to make a number of improvements to it.

Material

This study has been based primarily on the collection of the British Museum (Natural History), but I have also attempted to obtain on loan material from all other depositories holding significant collections of African Phaneropterinae. The most important of these have been the Academy of Natural Sciences of Philadelphia (about 4000 specimens from various parts of Africa) and the Musée Royal de l'Afrique Centrale, Tervuren (about 2000 specimens, mostly from Zaire). All the depositories from which I have obtained material are listed below, together with the abbreviations I have used for them.

AMNH, New York	American Museum of Natural History, New York, U.S.A.
ANS, Philadelphia	Academy of Natural Sciences of Philadelphia, U.S.A.

BMNH	British Museum (Natural History), London, England.
CAS, San Francisco	California Academy of Sciences, San Francisco, U.S.A.
IEE, Madrid	Instituto Español de Entomologia, Madrid, Spain.
IFAN, Dakar	Institut Fondamental d'Afrique Noire, Dakar, Senegal.
IRSNB, Brussels	Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium.
ITZ, Amsterdam	Instituut voor Taxonomische Zoölogie, Amsterdam, Netherlands.
IZU, Siena	Istituto di Zoologia dell'Università di Siena, Italy.
MCSN, Genoa	Museo Civico di Storia Naturale, Genoa, Italy.
MHN, Geneva	Muséum d'Histoire Naturelle, Geneva, Switzerland.
MLZA, Lisbon	Museu e Laboratório Zoológico e Antropológico, Lisbon, Portugal.
MNHN, Paris	Muséum National d'Histoire Naturelle, Paris, France.
MNHU, Berlin	Museum für Naturkunde der Humboldt-Universität, Berlin, East Germany.
MRAC, Tervuren	Musée Royal de l'Afrique Centrale, Tervuren, Belgium.
MZSUS, Florence	Museo Zoologico della Specola of the Università degli Studi, Florence, Italy.
NM, Bulawayo	National Museum, Bulawayo, Rhodesia.
NM, Vienna	Naturhistorisches Museum, Vienna, Austria.
NR, Stockholm	Naturhistoriska Riksmuseet, Stockholm, Sweden.
TM, Budapest	Természettudományi Múzeum, Budapest, Hungary.
TM, Pretoria	Transvaal Museum, Pretoria, South Africa.
UM, Oxford	University Museum, Oxford, England.
ZI, Leningrad	Zoological Institute, Leningrad, U.S.S.R.

Methods

In the diagnoses and descriptions of genera and species I have followed my usual conventions and methods (see Ragge, 1957: 124) and have used the wing-vein nomenclature of Ragge (1955). The characters chosen for study are discussed in the next section (p. 70); the basic generic characters used are described in a standard sequence in all the generic diagnoses, additional characters being included where appropriate to particular genera. In genera that are revised I have given for each species a brief summary of the important distinguishing characters in the form of a formal diagnosis, adding a fuller description only when the species is new; for new species in monotypic genera the formal diagnosis is omitted. All the measurements are given in millimetres.

For examination of the stridulatory file I have used the replica technique described by Ragge (1969: 172). The diagrams, tooth-counts and measurements of the file were all made from such replicas. The scanning electron microscope can also be used to produce excellent pictures of the stridulatory file, but the fact that a fore wing has to be sacrificed in each specimen studied precluded the use of this technique in the present study. It is probable, as Leroy (1972) has suggested, that the study of the surface ultrastructure of other parts of the integument would reveal further characters of taxonomic importance at the specific level, but I have had insufficient time (and often inadequate material) to investigate this possibility in the course of this review.

As is discussed more fully on p. 82, it would be premature to consider the evolutionary history of the genera reviewed here without taking into account the African Phaneropterinae with auriculate tympana and the Phaneropterinae of other parts of the tropics, especially the Neotropical Region. In making a broader study of this kind the use of a numerical analysis of the generic characters or the reconstruction of a cladogram using 'Hennigian' principles might well give interesting results, but such techniques would clearly have been out of place in the present review.

In genera that are not revised I have listed the included African and Arabian species alphabetically, without synonyms. The synonyms of such species are given in the Check-list (p. 183) and their full type information is given by Ragge (1968).

The diagrams of stridulatory files were made by projecting an image of the replica (see above) on to the drawing paper by means of a microprojector. All the remaining drawings were made with the aid of a camera lucida. Drawings of whole insects are given for all the genera in which such drawings show useful diagnostic characters.

The oscillograms shown in Figs 2–5 were made with a Mingograf 34T.

Characters studied

The basic characters studied in all the genera examined have been those traditionally used in the taxonomy of the Phaneropterinae, although I have sometimes departed from earlier workers in the relative importance I have attached to them. For example, the presence or absence of the fore coxal spine, used by Brunner (1878; 1891) and Chopard (1954) as the first step in subdividing the subfamily, I have considered too variable a character to be used in this way: in seven of the 42 genera embraced by this review, including *Phaneroptera* itself, this spine can be present or absent. I have therefore preferred to use the nature of the fore tibial tympana as a first means of segregating the genera. This character seldom varies within a genus and has the additional advantage of dividing the Phaneropterine genera into three rather than two groups: open tympanum on both sides (the group reviewed here), open on the outer side and auriculate on the inner side, and auriculate on both sides. Only two of the genera reviewed here, *Catoptropteryx* and *Eurycorypha*, show significant variation in this character. One species of *Catoptropteryx*, *C. aurita*, and one species of *Eurycorypha*, *E. ornatipes*, sometimes have a quite well developed auricle on the inner tympanum. In a few other genera the tympana show a slight tendency to develop auricles, but in only one case, *Trigonocorypha*, does this tendency become sufficiently pronounced in some specimens that their tympana could perhaps be regarded as intermediate between the fully open and fully auriculate types.

I have deliberately ignored the characters of the meso- and metasternum, often used in past taxonomic work on the Phaneropterinae, on the grounds that their usefulness is rather limited and outweighed by the frequent difficulty in examining them. On the other hand, in the genera *Dioncomena* and *Eulioptera*, both fully revised in this review, I have used the characters of the stridulatory file for the first time, as they have proved to be crucial in distinguishing between species that are closely similar in other characters. The stridulatory file is also difficult to examine, and so I have used it only when no more convenient characters were available.

Further notes on particular characters are given below.

Head

The fastigium of the vertex (Fig. 6) is frequently useful at the generic level. Its relative width (conveniently compared with the adjacent first antennal segment), whether it is sulcate, and its general shape, all provide important characters. In relation to the fastigium of the frons it varies among different genera from being more or less horizontal, forming a right-angle with the vertical frons, to sloping so steeply that the two fastigia meet in the same plane with no more than a fine suture to show where the two otherwise continuous surfaces meet. A few genera have prominent carinae in the region where the frons and genae meet; I have referred to these as 'frontogenal carinae' although they do not necessarily lie exactly along the lateral boundaries of the frons.

The shape and degree of prominence of the eyes are often useful in distinguishing between genera. I have described the eyes as 'circular' if their outline appears to be circular or almost so when viewed at right-angles to their plane of insertion on the head (Figs 7–9). Any noticeable departure from circularity is referred to as 'oval'. The eyes are described as 'very prominent' if they narrow appreciably before meeting the head.

There is no doubt that the relative length and thickness of the antennae differ to some extent between genera, but these appendages are so often lost or shortened by breakage that I have considered it pointless to attempt to make use of these differences.

Thorax

The shape and surface texture of the pronotum frequently provide important generic characters. Indeed, a number of genera can be recognized from the pronotum alone, although it is often impossible to describe the shape accurately in words and sometimes difficult to illustrate it adequately with a drawing. The very prominent and crenulate lateral pronotal carinae of *Trigonocorypha* are unique among the genera treated here, as is the pronounced median carina of *Tropidonotacris*. The thoracic pleura do not vary much between genera and, as mentioned above, I have deliberately ignored the characters of the sterna which are not very often useful and frequently difficult to examine.

Legs

The presence and size of the fore coxal spine is often useful at the generic (and sometimes specific) level but, as discussed above, I have not followed past workers in using it as a first means of subdividing the subfamily.

The armature of the femora and tibiae (Fig. 1) is of considerable taxonomic importance at both generic and specific levels. As it is a universal (and sensible) practice to position the legs of pinned specimens of Saltatoria so that the fore legs are directed forwards and the other two pairs backwards, I have followed my usual convention of describing the spines and spurs as 'internal' or 'external' on the assumption that the legs have been set in these positions. Although convenient to use, this convention is not really logical, as familiarity with these insects soon makes it clear that the internal and external armature of the fore legs corresponds, respectively, to the external and internal armature of the mid and hind legs. For example, when all the spinules of the fore femora are internal, all those of the mid femora (and sometimes the hind femora) are likely to be external. The alternative system, used by a number of past workers, of describing the spines and spurs as 'anterior' or 'posterior', on the assumption that the legs project sideways at right-angles to the body, is thus anatomically more logical, but seldom literally true and thus less convenient to use; the armature of the hind tibiae is in any case always quite different from that of the fore and mid tibiae. As is general practice, I have described the armature as 'dorsal' or 'ventral' on the assumption that the legs are extended horizontally, although in some parts of the world it has been customary to set specimens of Saltatoria with the legs flexed, so that the dorsal and ventral tibial armature becomes, in literal terms, reversed in position.

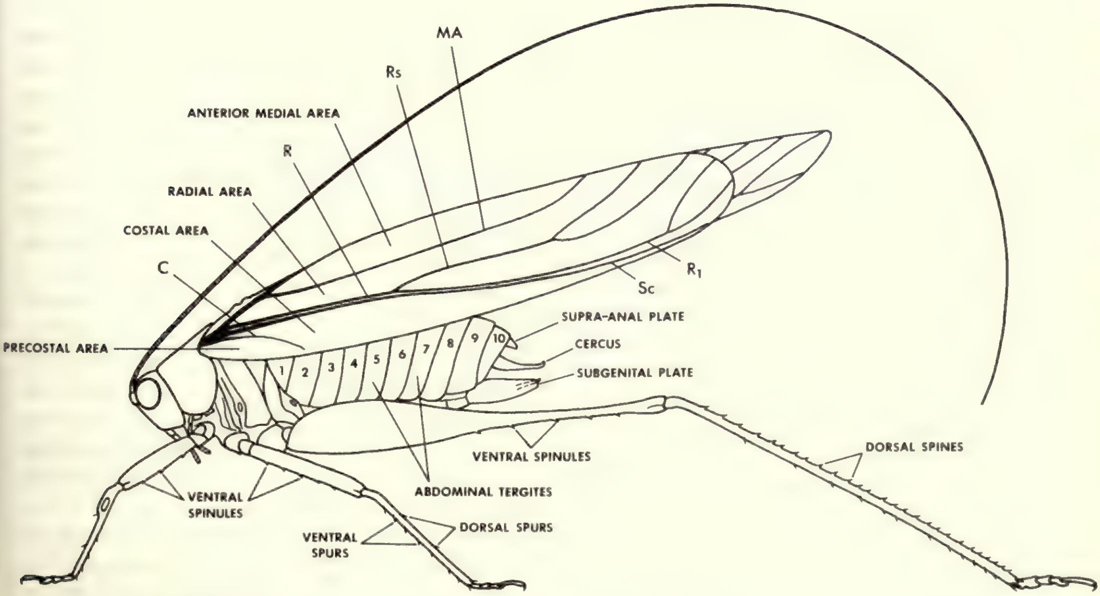


Fig. 1 A typical male Phaneropterine, showing some of the taxonomically useful characters.

In the diagnoses and descriptions of species I have given the total numbers of ventral spinules on the femora, including both internal and external ones unless otherwise specified (but excluding any on the genicular lobes). For the tibiae, however, I have followed my usual practice of counting only the external ventral spurs of the fore and mid tibiae and the external dorsal spines of the hind tibiae. There is seldom, if ever, anything to be gained taxonomically by describing, in addition, the remaining armature of the tibiae, except for the apical spurs of the hind tibiae in the few cases where these vary in number within a genus (e.g. *Ducetia* and *Eulioptera*), and the internal apical spurs of the male mid tibiae in the cases mentioned below.

There is a group of six Central and East African genera in which the apical or subapical spurs on the inner side of the mid tibiae are modified in some way in the male, while being completely normal in the female. In *Atlasacris, Ivensia, Pronomapyga, Monticolaria* and *Meruterrana* the males have a greatly enlarged internal spur at or near the apex of the mid tibiae; in *Odonturoides* the internal apical spurs of the male mid tibiae are also always modified in some way and in one of the three species known at present one of these spurs is greatly enlarged. In *Atlasacris* the first segment of the male mid tarsi is also enlarged, clearly in association with the enlarged mid tibial spur, and this is also true, though to a less extent, of *Ivensia scaura*. Males of *Meruterrana* and *Odonturoides* are extremely unusual among African Phaneropterinae in having a total of three internal apical spurs on the mid tibiae; the females have only two, as is normal in both sexes in other Phaneropterinae (a few genera having only one). These enlarged or otherwise modified spurs have been largely unnoticed by previous workers; their function is quite unknown, but as they are confined to the males it is likely that they have a role in courtship or copulation.

Terpnistria is most unusual among African Phaneropterinae in that the dorsal spurs of the fore and mid tibiae are replaced towards the base by broad-based spines; this is also sometimes true of *Diogena* and *Tropidophrys*. In *Gelatopoia* the fore and mid tibiae have no dorsal spurs except at the apex, but the mid tibiae have broad-based, thorn-like dorsal spines on each side. There is also one undescribed species of *Eurycorypha* in the BMNH collection in which the fore and mid tibiae have spines near the base.

Throughout this work I have, as usual, confined the term 'spine' (or 'spinule') to simple, rigid cuticular outgrowths and 'spur' to clearly articulated structures capable of at least some movement in relation to the surrounding cuticle.

Wings

The degree of development of the wings seldom varies much within a genus but is quite often useful at the generic level. It would be difficult to distinguish between *Odontura* and *Ducetia*, for example, were it not for the extreme brachypterism shown by the former genus, and the discovery of the very brachypterous females of *D. crosskeyi* and *D. levatiala* (together with the inclusion in *Ducetia* of two brachypterous species formerly assigned to *Epiphlebus*) has blurred even this distinction. The sexual dimorphism in wing development shown by *D. crosskeyi* is unusually extreme, even more so than that shown by the African Acrometopae (Ragge, 1960*a*). *Peropyrrhicia guichardi* is most unusual among brachypterous Orthoptera in that the females have longer fore wings than the males.

As is typical of the Phaneropterinae, the hind wings protrude beyond the fore wings in almost all the fully winged genera treated here. Exceptions are *Pardalota, Poecilogramma, Euryastes* and *Corycomima*, none of which is particularly long-winged. In *Tropidonotacris* and *Ectomoptera* the hind wings do not extend beyond the fore wings in the female, while doing so in the male; the more extreme forms of sexual dimorphism shown by *Ducetia* may also be found in *Ivensia*, the females of which are not yet known for certain. In the males of *Ivensia scaura* the hind wings extend beyond the fore wings by more than three-quarters of the length of the fore wings themselves, relatively further than in any other Phaneropterine known to me.

The overall shape of the fore wings, more easily illustrated than described, varies a lot at generic level, showing a general tendency (with some exceptions) to be broader in forest species, perhaps in order to resemble leaves, and narrower in savanna species. *Dithela* and *Ectomoptera* are unusual in that the hind margin of the male fore wings is markedly excavate just beyond the stridulatory region, to such an extent in *Ectomoptera* that part of the metanotum is exposed even when the wings are flexed.

The texture and shininess of the fore wings (and exposed part of the hind wings) are often useful generic characters. The shininess and translucency of the fore wings of *Eulioptera* provide the main character distinguishing this genus from *Phaneroptera*. The degree of opacity of the fore wings depends on the density of the archedictyon and the thickness of its veinlets, and reaches an extreme, among the genera treated here, in the rather leathery fore wings of *Corycomima*.

I have carefully considered various aspects of the venation of the fore wings as characters possibly useful at the generic level, but there is a high level of intraspecific variability in the details of the wing-venation so that many of its features are taxonomically unreliable. The only feature I have included routinely in the generic diagnoses is the extent to which *Sc* and *R* are approximated in the fore wing. This is usually fairly constant within a genus, but in different genera these veins vary from being completely separate throughout their length (e.g. *Corymeta*, *Gabonella*) to being contiguous except at their distal ends (e.g. *Eurycorypha*, *Plangia*); many genera are intermediate, with these veins separate at the base but becoming contiguous or almost so for part of their length (e.g. *Pardalota, Euryastes*). The contiguity of *Sc* and *R* seems to be associated, at least sometimes, with leaf-resemblance, the combined veins representing the midrib of a leaf. I have included other taxonomically useful features of the wing-venation in the generic diagnoses only when they are reliably characteristic of the genera concerned, for example the pectinately branched radius in *Ducetia, Tropidonotacris, Corymeta, Bueacola, Ectomoptera* and *Milititsa*.

The wing-vein nomenclature used throughout is that of Ragge (1955) and is illustrated in Fig. 1.

The shape of the stridulatory file of the left male fore wing and the number and arrangement of its teeth are often useful at the specific level. These characters have been largely ignored in past taxonomic work, no doubt because of the difficulty in examining them. For the same reason I have used the characters of the stridulatory file in this review only when their use is necessary for a completely reliable specific identification, as proved to be true of some species of *Dioncomena* and *Eulioptera*. The stridulatory file in these two genera alone shows a wide variety of form, even among species that are closely similar in all other characters (see Figs 102–108 and 155–173). *Eulioptera disparidens, E. umbilima, E. flexilima, E. longicerca* and *E. spinulosa* are all difficult or impossible to identify reliably without examination of their highly characteristic stridulatory files.

Abdomen and genitalia

In the group under review the only abdominal characters that are taxonomically useful (apart from colour) are those confined to one sex, or at least developed to a different extent in the two sexes. These are (occasionally) the ninth and (more often) the tenth abdominal tergites, the subgenital plate, the male (rarely the female) cerci and the ovipositor. Although most useful at the specific level, one or more of these structures is occasionally characteristic of a genus, for example the highly modified tenth abdominal tergite and subgenital plate of all five species of *Peropyrrhicia*.

The ninth abdominal tergite is seldom affected by these sexual modifications, but *Scolocerca* and *Bueacola* are exceptional in having a median projection from this tergite; in *Scolocerca* this modification is shown by both sexes, though it is a little smaller in the female, and this is probably also true of *Bueacola*, in which the female is not yet known. In *Peropyrrhicia* the ninth abdominal tergite is somewhat enlarged in the male, no doubt in association with the highly modified tenth abdominal tergite. In the males of *Dioncomena ornata* the ninth abdominal tergite is also somewhat enlarged, and in those of *D. zernyi* it is even more enlarged and profusely hairy; in the males of *D. bulla* this tergite is emarginate where it is overlapped by an extraordinary protuberance from the tenth abdominal tergite. In the females of these species and of all the species of *Peropyrrhicia*, and in both sexes of all the other known species of *Dioncomena*, the ninth abdominal tergite is unmodified.

The tenth abdominal tergite is modified in some way in the males of at least some of the species of about half the genera reviewed here, and in a few of these genera this tergite also shows some modification, though always less pronounced, in the females. The form taken by the modification varies greatly both within and between genera, but almost always involves enlargement of the tergite and often its backward prolongation into some kind of median projection, usually heavily sclerotized. The structure of this tergite in the males of *Peropyrrhicia massaiae* and *P. antinorii* (Figs 53, 54, 58, 59), including sharp lateral spines, is probably the most bizarre to be found in the African Phaneropterinae. The tenth abdominal tergite of the males of some of the species of *Pardalota* is most unusual in being asymmetrical: it bears two posterolateral processes that are quite different in shape.

The shape of the subgenital plate is often useful at the specific level in both sexes, but seldom at the generic level in either sex; the long processes on the male subgenital plate of *Peropyrrhicia*, however, are characteristic of the genus. In ten of the genera under review the male subgenital plate bears a pair of styles, and in an eleventh, *Eurycorypha*, these appendages are present in some of the species but not in others. The styles vary in size from being large enough to be characteristic of the genus, as in *Corycomima*, to being extremely small, as in *Oxygonatium*. In some species the male subgenital plate bears a pair of style-like processes that can be distinguished from true, articulated styles only by a close examination.

The male cerci provide one of the most useful characters for distinguishing between species, but not between genera (except for monotypic ones). The relative length, thickness and shape, especially at the tip, are all potentially useful, and occasionally there are highly characteristic additional structures, such as the large dorsal spike carried by the male cerci of *Parapyrrhicia acutilobata*; the male of this species is also unusual in having a large, sharply pointed, median phallic process of a kind I have not seen in any other African Phaneropterine. The female cerci are simple structures, usually tapering evenly to a blunt point, but in *Corymeta* and *Milititsa* they are unusually long and slender and in *Parapyrrhicia* they are unusually short, ending rather abruptly so that they have a 'docked' appearance.

The ovipositor and associated basal structures are frequently useful in distinguishing between species. The shape, size and marginal denticulation or crenulation are all of potential value, and there is sometimes a taxonomically useful lip or lobe at the base of the ventral valves. Although the ovipositor is not often useful at the generic level, *Catoptropteryx* is well characterized by its much reduced ovipositor, and in this genus the basal sclerites associated with the ovipositor are important in distinguishing between the species. The relatively large, finely toothed ovipositor of *Peropyrrhicia* is fairly characteristic of the genus, and the shape of the long, relatively narrow ovipositor of *Kevaniella* (Fig. 17) is not matched by any of the other genera under review. The nature of the denticulation or crenulation of the ovipositor is usually fairly constant within the genera, but in *Ducetia*, *Poecilogramma* and *Symmetropleura* the ovipositor is either finely or coarsely toothed in different species. When well developed the ovipositor is usually toothed or crenulate on part of both dorsal and ventral margins, but in *Corycomima* the ventral valves are entirely smooth-edged.

Colour

The colouring in life of Phaneropterinae frequently provides useful taxonomic characters at the specific level, and can sometimes be used even to characterize genera. The colouring almost always deteriorates after death, however, unless special methods, such as freeze-drying, are used. Preservation in alcohol, frequently used in the past (especially on expeditions), results in the rapid loss of almost all the natural colouring, and specimens dried after such preservation are often a fairly even pale brown colour and sometimes rather shrivelled as well. Fortunately, much of the material used in the present study was collected comparatively recently and dried rapidly, so that the natural colouring is quite well preserved. For a number of species I have in addition been provided with colour photographs of live or freshly killed insects; most of these photographs were taken and kindly given to me by Drs N. D. Jago and Y. Gillon.

The species belonging to about half the genera studied here are predominantly green in colour, and this is almost always true of the species, mostly forest-dwelling, that seem, particularly in the form and venation of the fore wings, to resemble leaves. Some savanna species (e.g. some species of *Ducetia* and *Eulioptera*) seem to occur in two colour forms, one mostly brown and the other mostly green, a form of colour polymorphism similar to that commonly found in the Copiphorinae and one that is easily obscured by poor colour preservation in dried specimens.

Some genera, containing mostly forest or woodland species, are remarkable for their strikingly variegated colouring; *Pronomapyga, Meruterrana, Dioncomena, Pardalota* and *Poecilogramma* are notable examples. Another forest insect, *Monteiroa nigricauda*, shows disruptive colouring, at least in the females: all the females I have examined have a broad brown band across the middle of the fore wings, which are otherwise green (see Fig. 199). One combination of colour characters, a pattern of whitish markings on the predominantly green fore wings and a narrow dark band along the hind margin of the pronotal disc, is common to three genera, *Terpnistria, Diogena* and *Tropidophrys*, which also have several morphological features in common. *Gelatopoia* shows a remarkable cryptic coloration, a combination of dark brown and pale grey-green that closely resembles the lichens on which it lives; Dr A. W. R. McCrae has kindly provided me with a colour photograph of the live insect on its natural background, showing how effective a camouflage this colour pattern is.

Carl Brunner von Wattenwyl

Brunner played an all-important part in laying the foundations of modern taxonomic work on the Phaneropterinae, and I feel it appropriate to include here a brief appreciation of the high quality of his studies on this group. Born in Bern, Switzerland, on 13 June 1823, Brunner was educated at various centres in his home country and Germany, finally gaining a doctorate in 1846 after a three-year period in Berlin. There was a strong emphasis on natural science during his later education and he developed at this time a particular interest in geology.

On his return to Bern Brunner became a university lecturer in Physics and soon gained a professorship, but his university career proved to be short-lived. In 1851 the physicist Steinheil was commissioned by the Swiss government to introduce a telegraph service into Switzerland, and he chose Brunner to help him with this important project. Brunner soon became director of the Swiss telegraph service, and in 1857 he moved with his family to Vienna to become director of the Austrian telegraph service and later a ministerial advisor in the Ministry of Trade. It was in Vienna, where he lived for the rest of his life, that he developed his interest in Orthoptera and began to build up his magnificent collection of these insects. He collected Orthoptera himself during his frequent travels through Europe and obtained many specimens from other parts of the world by purchase and exchange. He maintained the collection with meticulous care and it soon became the finest private collection in the world.

During the early part of his career Brunner published a number of papers on non-biological subjects, especially geology and glaciology. After his move to Vienna, however, his published works became almost entirely concerned with insects, and very largely with Orthoptera. The quality of his taxonomic work on Orthoptera was unsurpassed in its day and compares favourably with many modern studies of the same kind. His *Monographie der Phaneropteriden* is a fine example of his work and has all the attributes of a high quality taxonomic monograph. Keys and descriptions are provided for all the tribes, genera and species, and full lists of measurements are given for every species. Every genus is illustrated with a drawing of one of the species, often showing the whole insect as well as enlargements of particular parts. Each specimen in his own collection bore an individual number on the pin and these numbers are cited where these specimens are listed in the monograph; when his new species were based on specimens in his collection, as they usually were, the specimens of the type-series can thus be identified with certainty. It is no wonder that Brunner was critical of Francis Walker's catalogues of Orthoptera, published by the British Museum a few years earlier. These catalogues were among Walker's later works and were an improvement in some ways on much of his earlier work on other groups; nevertheless he gave few keys and no illustrations, and the numerous new species were poorly described. Brunner (1870*a*; 1870*b*) wrote a strongly worded critique of Walker's cockroach catalogue (1868) in the form of an open letter to the Director of the British Museum, published in both French and German. In the *Monographie der Phaneropteriden* (p. 389) he describes Walker's five-volume catalogue of Saltatoria (1869–71) as being so 'unwissenschaftlich' that it was impossible to recognize the new species without studying the types; he apparently made no attempt to do this and so disregarded all Walker's new taxa in compiling his monograph. As a result of this a few of Brunner's new names are proposed for taxa already named by Walker, although none of these are included in the present review.

Brunner had clearly decided at the outset of his taxonomic work on Orthoptera that his time would be better spent on the preparation of monographic revisions than on the isolated description of new species or studies on collections brought back by expeditions. Three sentences from the Preface to one of his major works are worth quoting:

> 'Nous disposons de plusieurs travaux monographiques sur des groupes plus ou moins étendus des Orthoptères, mais l'ensemble du système présente de grandes lacunes. Il s'en suit que la description d'espèces isolées ne suffit pas pour les classer.
>
> 'Cette considération m'inspire une certaine appréhension contre toute description d'espèces isolées et m'engage à concentrer mon propre travail à l'établissement de monographies systématiques' (Brunner, 1893: 5).

The last of these monographic works, prepared jointly with Josef Redtenbacher, was *Die Insektenfamilie der Phasmiden*, published in three large volumes during the period 1906–08, when Brunner was in his eighties. According to Schulthess (1916) Brunner was still in excellent physical and mental health on his 90th birthday in 1913; he died after a short illness on 24 August in the following year.

Biology

Very little has so far been published on the biology of tropical Tettigoniidae. For tropical Africa the only significant studies are those of Eluwa (1970; 1971; 1972; 1975*a*; 1975*b*) on *Euthypoda acutipennis* Karsch (Mecopodinae), *Corycoides kraussi* (Kirby) (Mecopodinae) and *Zabalius apicalis* Bolívar (Pseudophyllinae), Bailey & McCrae (1978) on *Ruspolia* Schulthess (Copiphorinae) and Vosseler (1908) on *Eurycorypha* (Phaneropterinae). Little more is known of the biology of North African Tettigoniidae; references to earlier literature are given by Chopard (1943) and there has been one more recent comprehensive study on *Eugaster* Serville (Hetrodinae) by Grzeschik (1969). Two Palaearctic species of Phaneropterinae occurring in North Africa, *Phaneroptera nana* Fieber and *Tylopsis lilifolia* (Fabricius), have had their biology studied to some extent in Europe; references to these studies are given by Chopard (1951).

Using as a basis Vosseler's early work, together with studies on Phaneropterinae in other parts of the world, it is possible to suggest some probable features of the biology of African Phaneropterinae. In all the species of this subfamily studied the eggs are markedly flattened when freshly laid, becoming rather less so during embryonic development. They are laid in or on vegetation or in the ground, depending on the species. In *Phaneroptera nana* (see especially Grassé, 1924, and Goidanich, 1940) and the unidentified species of *Eurycorypha* studied by Vosseler (1908), the eggs are laid along the edges of leaves, inserted between the upper and lower surfaces. This mode of oviposition is known in several other Phaneropterinae occurring in various parts of the world, and doubtless occurs in a number of the African genera. In an unidentified species of *Catoptropteryx* a row of 29 eggs was observed by Dr M. C. Eluwa of the University of Nigeria to be deposited along the underside of a *Ficus* leaf (see Huxley, 1970: 137, pl. 1, fig. 1); this type of oviposition in rows is also known in the Australasian genus *Caedicia* Stål (Lysaght, 1925) and the North American genus *Microcentrum* Scudder (Riley, 1874), and it may well be quite common among the African Phaneropterinae. Oviposition in the ground is known in several Palaearctic genera of Phaneropterinae and in the North American genus *Amblycorypha* Stål; although none of the African species have been observed to lay their eggs in the ground it would be surprising if none of them did so, especially as the ovipositor shows a remarkable variety in size and shape among the genera reviewed here.

Vosseler (1908) found that the eggs of the species of *Eurycorypha* that he studied began to develop 6–8 weeks after they were laid if kept in humid conditions; the thickness of the eggs then increased until it had more than doubled before they hatched, about three months after being laid. He also found that the eggs developed even after being kept in dry conditions for 3–4 months. There were six nymphal instars, the last moult taking place about 7–11 weeks after hatching. The adults lived for 3–7 months.

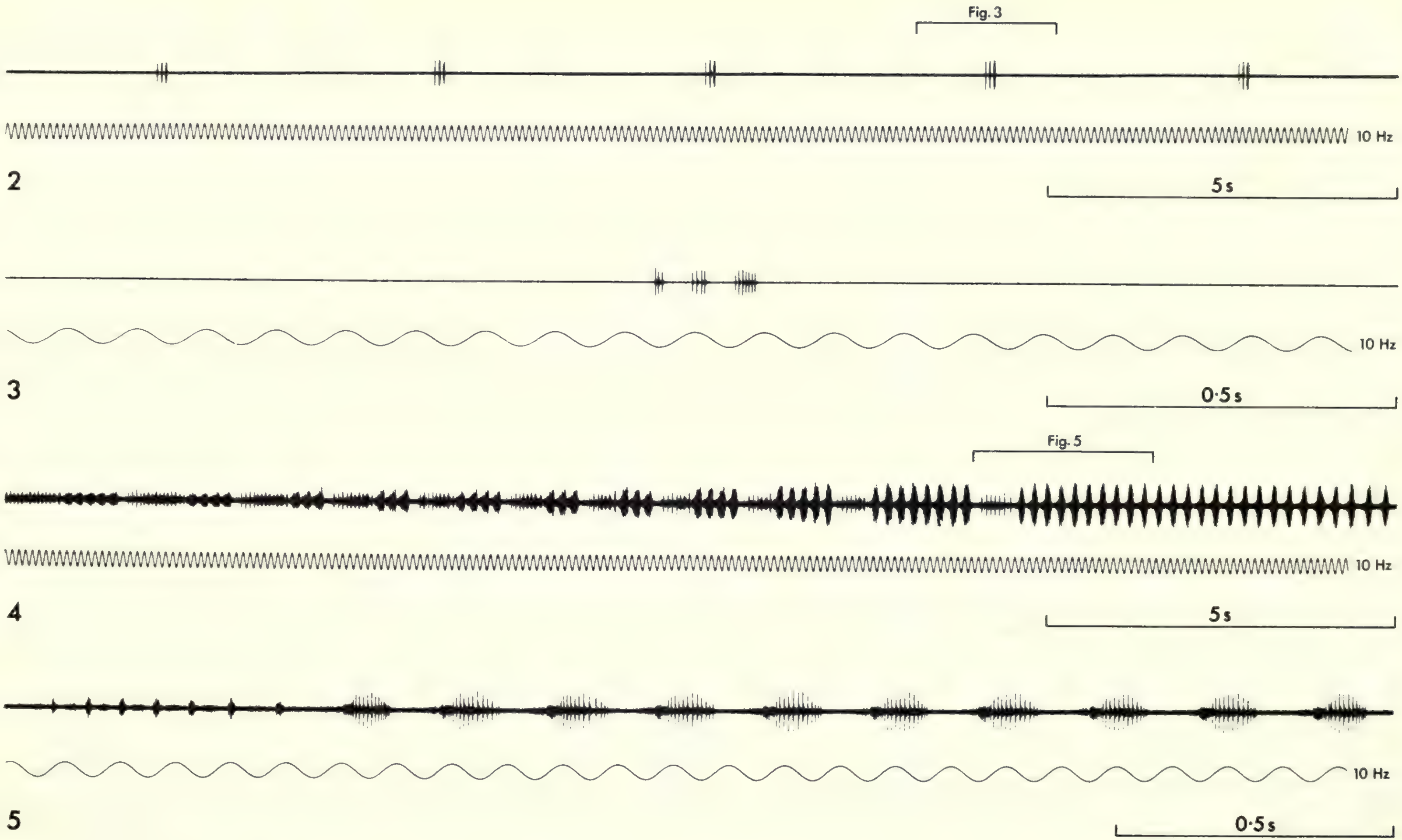
The nymphs of Phaneropterinae are often similar in appearance and colour to the adults, apart from their lack of wings; indeed, in the females of brachypterous species it is sometimes difficult to distinguish between a last-instar nymph and an adult. However, in at least three genera the young nymphs are quite different from the adults in both appearance and behaviour. *Eurycorypha* is one of these genera and the form taken by the nymphs is discussed on p. 180. The other two genera, *Trigonocorypha* and *Leptoderes* Serville, are Oriental, although *Trigonocorypha* occurs in the Arabian Peninsula and is therefore included in this review. In *Leptoderes* the nymphs resemble Cicindelid beetles, apparently using different models at different stages of the nymphal development (Uvarov, 1922). In *Trigonocorypha crenulata* Thunberg the young nymphs resemble ants and the older ones are perhaps mimics of a Cicindelid beetle (Chopard, 1924). The adults are leaf-like in appearance in all three of these genera.

The Phaneropterinae differ from most other Tettigoniidae in being almost exclusively phytophagous. The parts eaten include leaves, buds, flowers, fruits and even bark, and it is not unusual for a single species to feed on a wide variety of unrelated plants. Occasionally there is an admixture of animal matter; for example, *Phaneroptera* sometimes eats the leaf-galls caused by the vine Phylloxerid *Viteus vitifoliae* (Fitch) (= *Phylloxera vastatrix* (Planchon)) and has been recorded as showing a definite preference for galls containing eggs and larvae, which are also eaten (Fuschini, 1905). According to Dr N. Annandale the nymphs of *Trigonocorypha crenulata* feed on small caterpillars (Chopard, 1924). There are also records of Phaneropterinae feeding on aphids (Neruchev, 1949) and on each other (Lucas, 1920).

Most Phaneropterinae live on trees or shrubs, many of them having the shape and venation of the fore wings modified to resemble broad leaves; in some of these species Leroy (1973*b*) has observed rocking movements, which she refers to as 'wind mimicry'. Some species, however, live on grasses and these are often rather elongate insects with relatively narrow fore wings. Very little is known of the ecology of the tropical African Phaneropterinae, which have been mostly collected 'at light', but they clearly include both forest and grassland insects. The known distribution often gives an indication of ecological preference; for example, the fact that *Scolocerca* and *Oxygonatium* are known only from west of the Togo/Benin gap in the lowland forest of West Africa suggests that they are primarily forest insects. Most of the species that seem to be clearly associated with forests are uniformly green in colour, but savanna species often occur in two colour forms, one mostly green and the other mostly brown. It is quite likely that the species of African Phaneropterinae that are very poorly represented in collections live in the forest canopy and are not readily attracted to light.

Like many other Tettigoniidae, Phaneropterinae tend to become active towards the end of the day and are often quite strictly nocturnal. Here again, virtually nothing is known of the daily activity rhythms of the tropical African species, but it is likely that they follow this general trend; they are certainly frequently attracted to light at night.

The males (where known) of all the species of Phaneropterinae included in this review have well developed stridulatory organs and thus almost certainly stridulate. It is also highly probable that the females of many of them produce sounds in response to the stridulation of the males, as has often been observed in other parts of the world (Petrunkewitsch & Guaita, 1901; Lysaght, 1931; Fulton, 1933; Henry, 1939; Spooner, 1968; Leroy, 1969; 1971; Ayal, Broza & Pener, 1974; Hartley & Robinson, 1976). The songs of the tropical African Phaneropterinae are almost entirely unknown; the only species included in this review for which I have a tape recording of the song is *Plangia graminea*, and oscillograms of this song are illustrated in Figs 2, 3. I am also taking this opportunity of illustrating oscillograms of the song of another African Phaneropterine, *Horatosphaga leggei* (Kirby) (Figs 4, 5), although this species has auriculate



Figs 2–5 Oscillograms of the songs of (2, 3) *Plangia graminea* and (4, 5) *Horatosphaga leggei*. The songs were recorded by Dr W. J. Bailey in December 1970 at Kisoro in south-west Uganda, using an Akai X–IV tape recorder at 9·5 cm/s tape speed.

tympana and is therefore not included in this review. The tape recordings used in preparing these oscillograms were made in Uganda by Dr W. J. Bailey, who has kindly presented them to the BMNH. I have not heard the songs of any other species of tropical African Phaneropterinae, but it is highly probable that some of them would provide useful taxonomic characters for distinguishing between species that are morphologically very similar (e.g. *Eulioptera disparidens* and *E. umbilima* – see pp. 148–149).

A fuller account of the biology of this subfamily, dealing primarily with the Palaearctic fauna, is given by Bei-Bienko (1954).

Economic importance

The almost exclusively phytophagous feeding habits of the Phaneropterinae make all of them potential agricultural pests. In the southern parts of the Palaearctic and Nearctic Regions a number of Phaneropterinae cause damage to a variety of shrubs and trees. In western Europe *Barbitistes fischeri* (Yersin) is a periodical pest of vines and peach trees (Chopard, 1951), and *Polysarcus* (= *Orphania*) *denticauda* (Charpentier) causes damage to various crops during occasional population 'explosions', at which times it seems to occur in a special 'gregarious phase', perhaps analogous to that of locusts (Maneval, 1926; Della Beffa, 1948*a*; 1948*b*); *Isophya pyrenaea* (Serville) is also an occasional pest. Bei-Bienko (1954) lists 21 Phaneropterine agricultural and forestry pests in the southern U.S.S.R., causing damage to a wide variety of cultivated plants, including vines, tobacco, citrus and various field crops. In North America *Microcentrum rhombifolium* (Saussure) sometimes causes damage to trees, feeding on both leaves and flowers, and *Scudderia furcata* Brunner is also an occasional pest (Helfer, 1953; Johnson & Lyon, 1976).

The tropical Phaneropterinae also include a number of known pests. Kalshoven & van der Vecht (1950) describe damage to various crops in Indonesia caused by species of *Holochlora* Stål, *Ducetia*, *Elimaea* Stål and *Phaneroptera*. Grist & Lever (1969) mention *Phaneroptera furcifera* Stål and *Ducetia japonica* (Thunberg) (as '*thymifolia*') as rice pests in the Philippines and Indo-Malaya, respectively. In New Guinea *Phaneroptera brevis* Serville is a minor pest of peas, beans, tobacco, coffee, sweet potato and cabbage (J. N. L. Stibick, *in litt.*).

Little has been published on the pest status of African Phaneropterinae. Harris (1932) lists *Phaneroptera sparsa* (as '*nana*') as a pest of tea, and both this species and *Poecilogramma striatifemur* as cotton pests in East Africa. Chopard (1954) remarks that some African species of Phaneropterinae are pests, particularly of coffee and cotton. Caswell (1962) mentions *Phaneroptera* as a possible pest of market gardens in southern Nigeria. Leroy (1973*a*) comments on the general tendency of African forest Tettigoniidae to cause damage to cultivated plants when these are established in areas from which the forest has been cleared, but she does not give specific examples from among the species she mentions, which include Phaneropterinae. It is probable that many of the African Phaneropterinae are liable to becomes pests whenever they are unusually abundant, as is true of the Copiphorine *Ruspolia differens* (Serville) in East Africa (Bailey & McCrae, 1978) and the recently discovered Decticine *Decticoides brevipennis* Ragge in Ethiopia (Ragge, 1977*a*).

Biogeography

Two of the genera included in this review do not apparently occur in tropical Africa: *Odontura*, a Mediterranean genus occurring in North Africa*, and *Trigonocorypha*, an Oriental genus occurring in the Arabian Peninsula and Madagascar but not on the African mainland. Of the remaining 40 genera only four occur outside the Afrotropical Region: *Diogena, Ducetia, Phaneroptera* and *Symmetropleura*. *Diogena* is typically Afrotropical (including the southern Arabian Peninsula), but its range extends northwards across the Sahara to the southern foothills of the Atlas Mountains, thus making it one of the only four genera of Phaneropterinae occurring

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**O. capensis*, a South African species that I have retained in *Odontura* purely as a temporary expedient, is discussed on pp. 104–105.

in North Africa; the other three are *Odontura, Phaneroptera* and *Tylopsis* Fieber (which has auriculate tympana and is therefore excluded from this review). *Ducetia* is distributed across the whole of tropical Asia (excluding the Arabian Peninsula), reaching Japan, New Guinea, the Solomon Islands and northern Australia. *Phaneroptera* is even more widespread, occurring in all these regions and, in addition, in the Arabian Peninsula, Socotra, Madagascar, Aldabra, Seychelles, Mauritius and the southern Palaearctic part of Eurasia, up to about latitude 55°N. Both these are indisputable cases of widespread genera; although *Ducetia* includes at present a rather motley collection of species, it would remain equally widespread if restricted to the closest relatives of its Oriental type-species, *D. japonica*, since two African species, *D. loosi* and *D. fuscopunctata*, would be among them. *Symmetropleura* is a rather different case: apart from the two African and one Madagascan species at present assigned to it, it is a New World genus, occurring widely in South America, Mexico and eastern U.S.A. The two African species are not very similar either to each other or to the Neotropical type-species of the genus, but as the differences are not very striking I have preferred to treat them as congeneric until a more comprehensive study, based on more material than I have at my disposal at present, becomes possible. Nevertheless, *Symmetropleura* should not be taken as providing an indisputable case of a Phaneropterine genus occurring in both Neotropical and Afrotropical Regions. If, as seems likely, the African species are eventually regarded as generically distinct from the New World ones, they will be probably assigned to two genera, for one of which the name *Cameronia* is already available.

Of the 36 genera that are endemic to the Afrotropical Region, only four are known to occur in the Arabian Peninsula or Madagascar: *Eurycorypha* occurs in both, *Plangia* and *Parapyrrhicia* in Madagascar (the former also in the Seychelles) and *Peropyrrhicia* in the Arabian Peninsula. A fifth genus, *Phaneroptila*, is endemic to Socotra.

The 31 remaining genera are all confined to the African mainland, south of the Sahara, and adjacent small islands such as Zanzibar and the islands of the Gulf of Guinea. One of these genera, *Eulioptera*, is extremely widespread within this area, occurring throughout tropical Africa (including the islands of the Gulf of Guinea) and in the eastern part of South Africa. The related genus *Melidia* is also quite widespread in central, eastern and southern Africa, but it is not yet known from any islands and there is at present only one West African record, from Nigeria. *Catoptropteryx*, although typically a West and Central African genus, has one widespread East African species, so that its total range extends over most of tropical Africa. *Monteiroa* also has a widespread, though disjunct, distribution, with one West African species occurring from Guinea to Zaire, and one species known at present only from Mozambique.

The genera *Ivensia* and *Pardalota* tend to be Central African in distribution, with some species occurring in East Africa. *Poecilogramma* and *Dioncomena* have broadly similar ranges but are more typically East African with some species occurring in Central Africa. *Atlasacris* and *Pronomapyga* have much more restricted Central African distributions, being known at present only from the region of the Albert-Edward-Kivu rift-valley.

Eleven genera are exclusively East African: *Odonturoides, Meruterrana, Monticolaria, Tropidonotacris, Corymeta, Kevaniella, Ectomoptera, Euryastes, Terpnistrioides, Milititsa* and *Plangiodes*. Of these, *Kevaniella, Terpnistrioides, Milititsa* and *Plangiodes* are known only from the 'Horn' in its broadest sense, *Meruterrana, Monticolaria* and *Euryastes* are clearly highland insects, and only two genera, *Odonturoides* and *Corymeta*, extend further south than Tanzania. None of them are known from Uganda.

Nine genera are endemic to West Africa (including parts of Uganda, Zaire and Angola), although only two of these, *Tropidophrys* and *Gelatopoia*, are widespread in this region. Two genera, *Scolocerca* and *Oxygonatium*, are not known from further east than Ghana; they are probably forest insects to which the Togo/Benin gap in the forest has provided an effective barrier. The remaining five genera, probably also forest insects, are found only to the east of this gap: *Gabonella, Dithela, Pleothrix, Corycomima* and *Bueacola*.

It is rather surprising that none of the genera studied are endemic to the remaining region to be mentioned, southern Africa, especially as I have estimated (Ragge, 1974) that there is about a two-thirds endemicity at the specific level among the southern African Tettigoniidae as a whole. The single genus that I have not yet mentioned, *Terpnistria*, is typically southern African in distribution, but its range extends northwards in East Africa to Tanzania. It is likely that further studies will result in the recognition of two genera endemic to South Africa, one for *Odontura capensis* and one for *Symmetropleura plana*; the present generic assignments of these two South African species are retained here purely as a temporary expedient.

Although this review has been carried out mainly at the generic level, it would perhaps be appropriate to include here a few remarks on biogeography at the specific level. Apart from a few species in the Mediterranean genus *Odontura* and a single species of the Oriental genus *Trigonocorypha*, only five of the 182 species included in this review, all belonging to the widespread genus *Phaneroptera*, are believed to occur outside Africa (and adjacent islands), Madagascar and the Arabian Peninsula. *P. nana* occurs throughout the Mediterranean Region. *P. sparsa* occurs in south-eastern Spain and also extends through the Levant, across the Anatolian Steppe to Armenia, and along the northern border of Iran to the Hindu Kush. *P. gracilis* is believed at present to have a remarkably extensive range, including most of the Oriental Region and parts of Australasia. The fourth and fifth species, *P. albida* and *P. minima*, are deserticolous insects with a combined range extending eastwards from the Sahara across the Syrian and Arabian Deserts to Iran, Turkmenistan, Afghanistan and Pakistan, though both species may not occur in all these regions. *P. sparsa* is the only species in the genera under review whose occurrence in Madagascar (as well as Aldabra and the Seychelles) seems to be fairly reliably established, albeit in a distinct colour variety (Ragge, 1956: 235). The records of the Madagascan species *Eurycorypha prasinata* from various African localities (Karsch, 1889: 454) and of the South African species *E. cereris* from Madagascar (Saussure, 1899: 617) need confirmation. Among the African Phaneropterinae as a whole there is one other species, *Tylopsis bilineolata* Serville, which seems to occur in Madagascar, though again in slightly modified form (Ragge, 1964: 310).

Among the other species embraced by this review there is every gradation from species as ubiquitous as *Phaneroptera sparsa* to those apparently restricted to single mountains or islands. The genus *Eulioptera*, fully revised in this review, can be used to illustrate this diversity. *E. reticulata* is a widespread species in central and eastern Africa, its range extending from Ethiopia in the north to Cape Province in the south; it shows a fairly clear division into three subspecies, occurring in the northern, central and southern parts of its range. At the other extreme are *E. insularis*, known only from islands in the Gulf of Guinea, *E. monticola*, occurring only on mountain ranges in Tanzania, and *E. breviala*, confined to the vicinity of the Albert-Edward-Kivu rift-valley. Among the other species the distribution is often poorly known, but four are clearly West African, two are Central African, one is known at present only from the Chyulu Hills in southern Kenya and the remaining four occur in various more southerly parts of Africa.

Restricted distributions should of course be inferred with caution, and some species are bound to occur more widely than present collections suggest. Nevertheless, the very restricted distributions associated with the East African highlands seem to be well established. At least eight species seem to be confined to mountains in Tanzania: *Odonturoides plasoni, O. jagoi, Monticolaria kilimandjarica, M. meruensis, Dioncomena tanneri, D. jagoi, Eulioptera monticola* and *Euryastes jagoi*. Of these, two, *Dioncomena tanneri* and *Euryastes jagoi*, are at present known only from the Usambaras.

These distribution patterns, at both generic and specific levels, agree well with those shown by other insects and with what is currently believed to have been the recent climatic history of Africa (see especially Moreau, 1963; Zinderen Bakker, 1976). The faunistic regions of Africa suggested, for example, by Carcasson (1964: fig. 3) for butterflies are broadly in accordance with the trends shown by the Phaneropterinae. The tendency, shown by many groups, for the Ugandan fauna to have stronger affinities with West than with East Africa is reflected clearly by the Phaneropterinae. The fact that only two of the nine endemic West African genera (predominantly forest insects) straddle the Togo/Benin gap in the lowland forest suggests that this gap is of long standing, though possibly bridged during Pleistocene pluvial periods. East

Africa shows the usual greater complexity of distribution patterns, with several genera restricted to mountain ranges and others to the arid 'Horn'. South Africa appears to have a very poor Phaneropterine fauna; although this must be partly due to inadequate collecting, there seems to be no doubt that this region has far fewer genera and species than tropical Africa, as is only to be expected.

Inter-relationships

In his 1878 monograph Brunner segregated his 112 genera of Phaneropterinae into 40 groups, of which 16 included African species at that time. He used the plural of one of the included genera as a formal name for each group, and these names are clearly available under Article 11 (e) of the *International Code of Zoological Nomenclature*. In 1891 he added four further groups, based entirely on African insects, although one of these groups ('Anepitactae') is now placed in the Meconematinae; at the same time he merged one of his earlier groups ('Phrixae') with another ('Phyllopterae'). There has been no more recent survey of the whole subfamily, but Brunner's group names have been used, often informally, from time to time since then (e.g. Bolívar, 1906; Chopard & Kevan, 1954; Ragge, 1960*a*) and some of them have been given the currently recommended tribal suffix (-ini) by various workers (e.g. Yakobson, *in* Yakobson & Bianki, 1902–1905; Bei-Bienko, 1954).

About half the genera treated as valid in the present review have been described since Brunner's work of 1891. Some of these could be confidently assigned to one or other of his groups, but most of them are less obviously related to the genera known at that time. Indeed, if a formal tribal classification were now to be adopted for the African Phaneropterinae, at least half a dozen new tribes would be needed for some of the genera reviewed here. In my view it would be unwise to propose such a classification without a broader study of the tropical Phaneropterinae of both the Old and New Worlds. Careful comparison with the poorly known Neotropical fauna would be particularly desirable: although few genera of Tettigoniidae are at present considered to occur in both the Afrotropical and Neotropical Regions, there are often 'equivalent' genera on opposite sides of the Atlantic and their close morphological similarity would sometimes justify placing them in the same tribe. I therefore prefer not to propose in the present study a formal tribal classification for the genera under review, and shall confine myself to a brief informal discussion of their inter-relationships.

My use of the fore tibial tympana, rather than the fore coxal spine, as a first means of segregating the genera (see p. 70) has naturally resulted in a grouping that differs fairly radically from that of Brunner and his contemporaries. However, I have arranged the African genera with open tympana in a sequence that is broadly in agreement with Brunner's; genera that seem to be closely related are put together, but the overall sequence is not intended to suggest a general trend from the more primitive to the more specialized genera. Bei-Bienko (1954) is probably right in suggesting that the open tympana and fully developed fore coxal spine are primitive, but there is little doubt that the development of tympanal auricles and the loss of the fore coxal spine have occurred several times in different evolutionary lines. There would therefore be little point in suggesting a definitive sequence of the genera under review without also taking into account the African Phaneropterinae with auriculate tympana.

The first six genera treated in this review were all unknown to Brunner. They are of particular interest in that the apical or subapical spurs on the mid tibiae are modified in the male, while being quite normal in the female. Although the modifications take a rather different form in the different genera, it is quite possible that they indicate a natural affinity, especially as all six genera are Central and East African.

Brunner placed the genera *Odontura* and *Ducetia* in different and well separated groups. At that time all the known species of *Ducetia* were fully winged and therefore quite different in appearance from the invariably very brachypterous species of *Odontura*. However, several brachypterous species of *Ducetia* are now known, and indeed most of the African species seem to have brachypterous females; there are no longer clear-cut characters separating these genera, as discussed on p. 104, and so I have placed them together in this review. The brachypterous genus *Peropyrrhicia*, regarded by Brunner as a relative of *Odontura*, seems also best placed here, although well characterized by the highly modified male genitalia.

The genera *Corymeta, Milititsa* and *Tropidonotacris* share with the fully winged species of *Ducetia* the pectinately branched radius in the fore wing, but they are clearly not close relatives either of *Ducetia* or of each other; each occupies a quite isolated position among the African Phaneropterinae.

Pardalota and *Poecilogramma*, very similar in both general morphology and coloration, are probably closely related to each other. *Kevaniella* shows perhaps some slight affinity with these genera, as Chopard (*in* Chopard & Kevan, 1954) suggested, but seems to have no known close relatives in the Phaneropterinae.

Catoptropteryx is another isolated genus among the African Phaneropterinae, though showing some affinity with the Australasian genus *Caedicia* Stål.

There follow a number of genera that seem to be related, in varying degrees, to *Phaneroptera*. This genus is the most widespread one in the subfamily and *P. sparsa* is the most widespread African Phaneropterine and one of the commonest African insects. The genus most closely related to *Phaneroptera* is undoubtedly *Eulioptera* which, as a result of the addition of a number of new species in this review, is no longer very clearly separated from it (see p. 138). *Scolocerca*, although well characterized by its relatively broad fastigium of the vertex and modified tenth abdominal tergite, also seems to be a fairly close relative of *Phaneroptera*. The only African genera Brunner included with *Phaneroptera* in his group 'Phaneropterae' were *Dioncomena* and *Melidia*, and I see no reason to doubt this suggested affinity, though it is not a particularly close one in either case. *Parapyrrhicia* and its relative *Pleothrix* also seem to me to belong here, although Brunner assigned the former genus to his group 'Anaulacomerae'. *Gabonella* and *Dithela* are perhaps rather more isolated, but seem to show a greater affinity to *Phaneroptera* and its relatives than to any of the other African Phaneropterinae.

Each of the three genera *Bueacola, Ectomoptera* and *Euryastes* seems to have no close relatives among the African Phaneropterinae. *Bueacola* shares its most unusual modification of the ninth abdominal tergite with *Scolocerca*, but these two genera are so unlike in most other characters that they almost certainly developed this modification independently.

The three genera *Terpnistria, Diogena* and *Tropidophrys* form a very close-knit group with thorn-like spines on the legs, frontogenal carinae on the head and characteristic coloration. The fact that they are allopatric suggests a comparatively recent divergence from a more widespread ancestor. *Terpnistrioides* and *Gelatopoia* also seem to belong to this group, though standing somewhat apart from the other three genera.

All the remaining genera tend to have relatively broader wings than the other African Phaneropterinae with open tympana, and include the species that show some degree of leaf-resemblance. Among these genera *Trigonocorypha* is quite isolated: it is a primarily Oriental genus extending westwards as far as the Arabian Peninsula and Madagascar but with no relatives on the African mainland. *Symmetropleura* is a New World genus to which two African species are assigned as a temporary expedient (see pp. 80 and 174); there are again no close African relatives. *Corycomima*, characterized by its smooth, leathery fore wings and squat appearance, is also lacking in close relatives.

The remaining five genera have a rather similar general appearance and are probably quite closely related to one another. *Eurycorypha* is remarkable for the extensive speciation it has undergone with little change in general appearance; over 30 species have been named and there are a number of undescribed species in the BMNH collection. *Plangiodes* and *Oxygonatium* are close relatives of *Eurycorypha*, the former differing from it only in the width of the fastigia. *Plangia* and *Monteiroa* are quite closely related to each other, standing a little apart from the other three genera in the group.

The relationships between the African Phaneropterinae reviewed here and those of other regions have already been discussed under Biogeography (p. 79).

PHANEROPTERINAE Burmeister

Phaneropteridae Burmeister, 1838: 684. Type-genus: *Phaneroptera* Serville.

Camptoxiphae Serville, [1838]: 399. [Not based on the name of a contained genus and therefore unavailable under Article 11 (e) of the *International Code of Zoological Nomenclature*.]

Phaneropterinae; Saussure & Pictet, 1897: 310.

Scaphurinae Karny, 1925: 35. Type-genus: *Scaphura* Kirby. [Proposed on erroneous grounds – see Karny, 1926*a*: 12.]

♂ ♀. Head hypognathous, with more or less vertical frons; antennae inserted in high position, near vertex. Prosternum without spines. Dorsal surface of fore tibiae (beyond tympana) flat or concave. Hind tibiae almost always with dorsal apical spurs. First two tarsal segments without lateral grooves; first segment of hind tarsi without plantulae. Hind wings, when fully developed, usually extending beyond fore wings. Ovipositor usually quite short and deep, upcurved and almost always dentate or crenulate.

Discussion. The lack of lateral grooves on the first two tarsal segments is the most reliable single character for recognizing members of this subfamily, although the grooves are not always very clearly visible in other Tettigoniidae. In practice, in spite of the wide variety in their general appearance, most Phaneropterinae may be more easily recognized by a combination of more subtle characters. The forest species often have a very characteristic appearance, with broad, leaf-like fore wings, beyond which the tips of the hind wings almost always protrude. Species living in open woodland and grassland usually have narrower fore wings, and the hind wings often extend even further beyond them. Brachypterous species occur in most parts of the world, becoming particularly numerous in the eastern Mediterranean Region, where the extremely brachypterous species of such genera as *Poecilimon* Fischer and *Isophya* Brunner greatly outnumber the fully winged species of other genera. In very few of these cases is there any difficulty in recognizing these insects as Phaneropterines, the protruding hind wings probably providing the most useful clue in the fully winged species. In females the typically deep, upcurved, toothed and green-coloured ovipositor is also an important diagnostic feature in all these life-forms. Other Tettigoniidae in which the hind wings extend beyond the fore wings (e.g. many Conocephalinae, Meconematinae and Listroscelidinae) can be readily distinguished from Phaneropterinae on other characters, including the lateral groove on the first two tarsal segments.

I have discussed the status of the Phaneropterinae elsewhere (Ragge, 1968). In spite of a strong trend in recent years towards a finely split classification of the Orthoptera (see especially Kevan, 1977), the Phaneropterinae are still treated as a subfamily in most significant works published during the past decade (e.g. Beier, 1972; Harz, 1969; Key, 1970; Rentz, 1979) and it is still my view that there is nothing to be gained by giving the group family rank. Further comments on the raising in rank of Tettigonioid groups in general are given by Ragge (1977*b*).

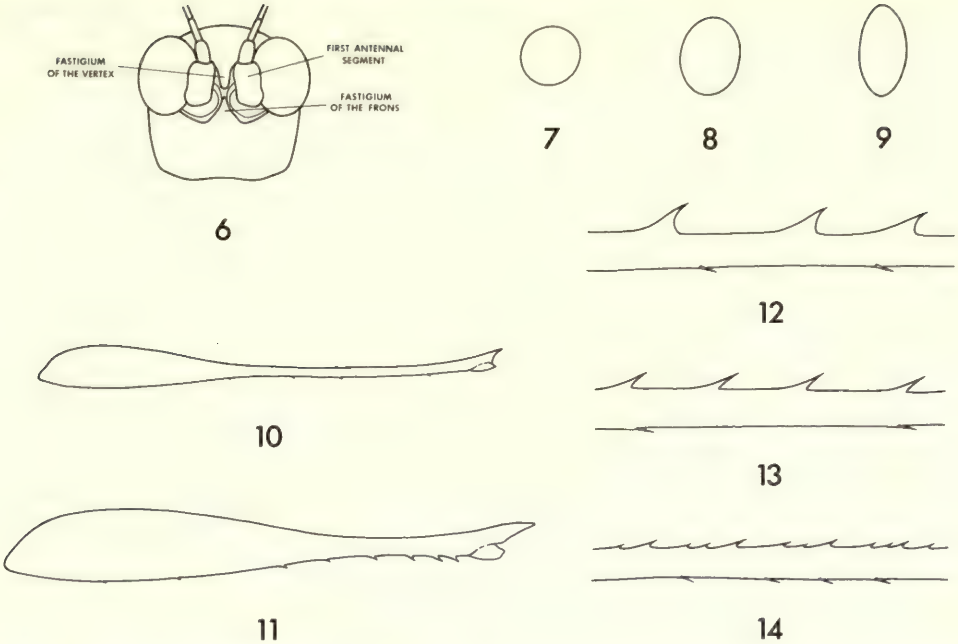
Distribution. The Phaneropterinae have a world-wide distribution, occurring in all temperate and tropical regions and extending northwards to about latitude 60°N. In both the Old and New Worlds by far the richest Phaneropterine fauna, in variety of form and number of species, is in the tropics.

Key to the genera of African and Arabian Phaneropterinae with open tympana

Diogena, which has auriculate tympana, is not included in this key; it is, however, included in the descriptive text (p. 170) as it is clearly a relative of *Terpnistria* and *Tropidophrys*, both of which have open tympana.

The key is purely for identification and is artificial in the sense that it is not intended to show the natural relationships of the genera. Several of the more 'difficult' genera are keyed out more than once.

1 Hind femora with an extended dorsal point at the tip (Figs 10 or 11) 2
– Hind femora without a dorsal point at the tip or with a very small point, not as in Figs 10 or 11 3
2 Fastigium of the vertex narrower than the first antennal segment. Fore coxae without a spine **GABONELLA** Uvarov (p. 132)
– Fastigium of the vertex much broader than the first antennal segment. Fore coxae with a well developed spine . . . . **OXYGONATIUM** gen. n. (p. 181)



Figs 6–14 Taxonomic characters of Phaneropterinae. 6. Anterodorsal view of part of the head of a typical Phaneropterine, showing the positions of the fastigia in relation to the first antennal segment. 7–9. Outlines of Phaneropterine eyes, showing (7) 'circular', (8) 'oval' and (9) 'oval and elongate' shapes. 10, 11. Lateral view of the left hind femur of (10) *Gabonella cothurnata* and (11) *Oxygonatium huxleyi*. 12–14. Lateral view of part of the left hind tibia of (12) *Terpnistria zebrata*; (13) *Atlasacris peculiaris*; (14) *Ducetia fuscopunctata*.

3 Dorsal spines of the hind tibiae unusually broad-based (often flattened and thorn-like), at least towards the base of the tibia (Fig. 12) 4
– Dorsal spines of the hind tibiae unmodified, of normal shape (Figs 13 or 14). 7
4 Posterior margin of the pronotum raised to form a prominent median crest or tubercle. . 5
– Posterior margin of the pronotum without a median crest or tubercle 6
5 Pronotum with a median posterior crest. Hind femora with the more distal ventral spines expanded into flat, pointed lobes . . . . ***TERPNISTRIA*** Stål (p. 169)
– Pronotum with a median posterior tubercle. Hind femora with unmodified ventral spinules . ***TERPNISTRIOIDES*** gen. n. (p. 171)
6 Head with prominent frontogenal carinae. Mid tibiae without thorn-like dorsal spines . . ***TROPIDOPHRYS*** Karsch (p. 171)
– Head without frontogenal carinae. Mid tibiae with broad-based, thorn-like dorsal spines. (General appearance highly characteristic – see Fig. 197) . . ***GELATOPOIA*** Brunner (p. 172)
7 Fastigium of the vertex at least as broad as the first antennal segment 8
– Fastigium of the vertex narrower than the first antennal segment 15
8 Eyes elongate (Fig. 9). Head with prominent frontogenal carinae (or at least a pronounced angle between the frons and genae) 9
– Eyes circular or oval (Figs 7 or 8), not elongate. Head almost always without frontogenal carinae 10
9 Fastigium of the vertex at least twice as broad as the first antennal segment . . . . . ***EURYCORYPHA*** Stål (p. 179)
– Fastigium of the vertex only slightly broader than the first antennal segment. . . . . ***PLANGIODES*** Chopard (p. 179)
10 Ninth abdominal tergite with a pointed median projection (Figs 110 or 111). *Sc* and *R* of the fore wings clearly separated . . . . ***SCOLOCERCA*** gen. n. (p. 133)

– Ninth abdominal tergite unmodified. *Sc* and *R* of the fore wings contiguous except near the apex . . . 11

11 Hind wings not extending beyond the fore wings (except sometimes very slightly as a result of shrinkage in dried specimens) . . . 12

– Hind wings clearly extending beyond the fore wings . . . 13

12 Fore wings smooth, leathery and characteristically shaped (Fig. 198). Hind femora with ventral spinules . . . ***CORYCOMIMA*** Karsch (p. 174)

– Fore wings of more normal texture, not shaped as in Fig. 198. Hind femora unarmed . . . ***PARDALOTA*** Karsch (p. 117)

13 Fastigium of the vertex about three times as broad as the first antennal segment . . . ***MONTEIROA*** Karsch (p. 176)

– Fastigium of the vertex less than twice as broad as the first antennal segment . . . 14

14 Fastigium of the frons broadly rounded or truncate. Fore and mid tibiae without dorsal spurs except at the apex . . . ***PLANGIA*** Stål (p. 175)

– Fastigium of the frons pointed. Fore and mid tibiae with one or more dorsal spurs in addition to the apical one . . . ***SYMMETROPLEURA*** Brunner (p. 173)

15 Vertex with a pronounced median carina . . . ***TROPIDONOTACRIS*** Chopard (p. 117)

– Vertex without a median carina . . . 16

16 Pronotum with a small dorsolateral tubercle on each side. Fore wings with a series of callosities on the principal cross-veins of the radial area (Fig. 184) . . . ***DITHELA*** Karsch (p. 163)

– Pronotum without dorsolateral tubercles. Fore wings without callosities in the radial area . 17

17 Fore wings reduced, not extending beyond the tip of the abdomen. Hind wings usually absent or greatly reduced, rarely extending beyond the fore wings. . . . 18

– Fore wings well developed, extending beyond the tip of the abdomen. Hind wings usually present, frequently extending beyond the fore wings . . . 31

18 Male . . . 19

– Female (unknown in *Atlasacris, Ivensia* and *Phaneroptila*) . . . 26

19 Mid tibiae with three internal apical spurs (Figs 37, 38 or 39) ***ODONTUROIDES*** gen. n. (p. 99)

– Mid tibiae with fewer than three internal apical spurs (not as in Figs 37, 38 or 39) . . 20

20 Mid tibiae with a much enlarged internal apical or subapical spur . . . 21

– Mid tibiae without an enlarged apical spur . . . 23

21 Tenth abdominal tergite with produced posterolateral angles . . ***ATLASACRIS*** Rehn (p. 89)

– Tenth abdominal tergite unmodified . . . 22

22 Pronotum smooth. Eyes oval . . . ***IVENSIA*** Bolívar (p. 91)

– Pronotum rather rugose. Eyes circular . . . ***MONTICOLARIA*** Sjöstedt (p. 97)

23 Tenth abdominal tergite highly modified, as in Figs 53–57 . ***PEROPYRRHICIA*** Brunner (p. 109)

– Tenth abdominal tergite unmodified or enlarged, not highly modified as in Figs 53–57 . . 24

24 Fore wings not reaching beyond the third abdominal tergite. Fore and mid femora unarmed. (Not occurring in East Africa or Socotra) . . . ***ODONTURA*** Rambur (p. 104)

– Fore wings reaching beyond the third abdominal tergite. Fore and mid femora with ventral spinules or, if unarmed, from the 'Horn' of East Africa or Socotra . . . 25

25 Hind wings moderately well developed, extending almost to the tips of the fore wings. (Socotra only) . . . ***PHANEROPTILA*** Uvarov (p. 122)

– Hind wings vestigial. (Not known from Socotra) . . . ***DUCETIA*** Stål (p. 105)

26 Mid tibiae with dorsal spurs in addition to the apical one . . . 27

– Mid tibiae without dorsal spurs except, sometimes, at the apex . . . 30

27 From North or South Africa . . . ***ODONTURA*** Rambur (p. 104)

– From tropical Africa . . . 28

28 From West Africa or the semi-desert 'Horn' of East Africa . . . ***DUCETIA*** Stål (p. 105)

– From East Africa, but not the semi-desert 'Horn' . . . 29

29 Fore and mid femora unarmed . . . ***ODONTUROIDES*** gen. n. (p. 99)

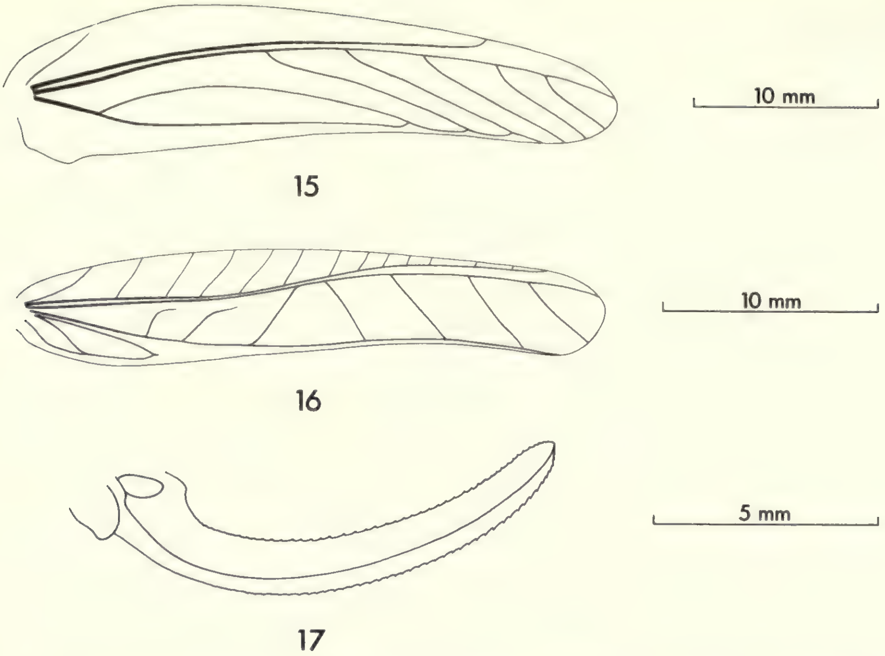
– Fore and mid femora with ventral spinules . . . ***DUCETIA*** Stål (p. 105)

30 Hind femora with ventral spinules. Ovipositor at least twice as long as the pronotum . . ***PEROPYRRHICIA*** Brunner (p. 109)

– Hind femora unarmed. Ovipositor much less than twice as long as the pronotum . . . ***MONTICOLARIA*** Sjöstedt (p. 97)

31 Hind wings vestigial or absent . . . ***DUCETIA*** Stål (p. 105)

– Hind wings well developed, usually extending at least to the tips of the fore wings . . 32
32 Pronotum with prominent, crenulate lateral carinae. (Arabian Peninsula only) . . . ***TRIGONOCORYPHA*** Stål (p. 172)
– Lateral pronotal carinae smooth or absent 33
33 Frons, pronotum and legs with profuse, very long hairs. Hind tibiae with fewer than 10 external dorsal spines . . . . ***PLEOTHRIX*** gen. n. (p. 162)
– Frons, pronotum and legs less hairy. Hind tibiae with more than 10 external dorsal spines . 34
34 General appearance as in Fig. 195, with the rather short fore wings broad at the base and sharply tapered distally, especially in the male . . . . . ***EURYASTES*** gen. n. (p. 167)
– General appearance not as in Fig. 195 35
35 Hind wings not extending beyond the fore wings (except sometimes very slightly as a result of shrinkage in dried specimens) 36
– Hind wings clearly extending beyond the fore wings 39
36 Coloration uniformly green (or yellowish brown in some dried specimens). Hind femora usually with at least one ventral spinule 37
– Coloration strikingly variegated. Hind femora unarmed. 38
37 Pronotum without lateral carinae, its surface smooth . . ***PHANEROPTILA*** Uvarov (p. 122)
– Pronotum with fairly distinct lateral carinae, its surface rugose (at least on the disc) . . ***ECTOMOPTERA*** gen. n. (p. 165)
38 Fastigium of the vertex poorly developed, as broad as the first antennal segment or almost so ***PARDALOTA*** Brunner (p. 117)
– Fastigium of the vertex well developed, much narrower than the first antennal segment. . ***POECILOGRAMMA*** Karsch (p. 118)
39 Fore and (usually) mid tibiae with at least one dorsal spur in addition to the apical one . 40
– Fore and mid tibiae without dorsal spurs except sometimes at the apex. 58
40 Male (unknown in *Milititsa*) 41
– Female (unknown in *Ivensia* and *Bueacola*) 50
41 Ninth abdominal tergite with a median posterior process . . ***BUEACOLA*** Sjöstedt (p. 164)
– Ninth abdominal tergite unmodified 42
42 Mid tibiae with one of the internal apical or subapical spurs conspicuously enlarged . . 43
– Mid tibial apical spurs unmodified. 44
43 Most of the head and legs and much of the rest of the body black. Mid tibiae with two unmodified internal apical spurs in addition to the enlarged one. (Kenya) . . . . ***MERUTERRANA*** Sjöstedt (p. 98)
– These parts not black. Mid tibiae with at the most one unmodified internal apical spur in addition to the enlarged one. (Not known from Kenya) . . . ***IVENSIA*** Bolivar (p. 91)
44 Venation of the costal area of the fore wings conspicuously sparser than that of the remaining areas . . . . ***KEVANIELLA*** Chopard (p. 119)
– Venation of the costal area of the fore wings similar to that of the remaining areas . . 45
45 Tenth abdominal tergite with a long, downwardly curved posterior process (Fig. 75) . . ***CORYMETA*** Brunner (p. 115)
– Tenth abdominal tergite without a long posterior process 46
46 *R* of the fore wings with pectinately arranged posterior branches, none of them branched again (as in Fig. 15, but the number of branches varying and the wing variously shaped) . . ***DUCETIA*** Stål (p. 105)
– *R* of the fore wings variously branched, but not with a simple pectinate arrangement and with the most proximal branch (*Rs*) bifurcate or trifurcate. 47
47 Coloration conspicuously variegated with differently coloured patches. *Rs* of the fore wings usually fused for part of its length with *MA* . . . ***DIONCOMENA*** Brunner (p. 122)
– Coloration more uniform, though sometimes with scattered small spots on the body or legs, or markings on the stridulatory organ or genitalia. *Rs* of the fore wings usually well separated from *MA* 48
48 Fore wings less than four times longer than their maximum width. . . . . . ***SYMMETROPLEURA*** Brunner (p. 173)
– Fore wings at least five times longer than their maximum width 49
49 Subgenital plate with a pair of styles . . . . ***CATOPTROPTERYX*** Karsch (p. 121)
– Subgenital plate without styles . . . . . ***PARAPYRRHICIA*** Brunner (p. 159)



Figs 15–17 Taxonomic characters of Phaneropterinae. 15. The right male fore wing of *Ducetia fuscopunctata*. 16. The right female fore wing of *Milititsa somaliensis*. 17. Lateral view of the ovipositor of *Kevaniella bipunctata*.

50 Ovipositor much reduced, smooth-edged or with a few small teeth at the tip of the dorsal valves ***CATOPTROPTERYX*** Karsch (p. 121)

– Ovipositor well developed, with teeth or crenulation on both dorsal and ventral valves . . 51

51 Venation of the costal area of the fore wings conspicuously sparser than that of the remaining areas. Ovipositor relatively long and narrow, as in Fig. 17 . . ***KEVANIELLA*** Chopard (p. 119)

– Venation of the costal area of the fore wings similar to that of remaining areas (except, sometimes, for a narrow translucent band along the anterior margin). Ovipositor not shaped as in Fig. 17 52

52 Tenth abdominal tergite produced slightly posteriorly . . . ***CORYMETA*** Brunner (p. 115)

– Tenth abdominal tergite unmodified 53

53 Fore wings with characteristic venation (Fig. 16) . . . . . ***MILITITSA*** Burr (p. 117)

– Venation of fore wings not as in Fig. 16 54

54 Coloration conspicuously variegated with differently coloured patches (abdomen with a dark brown or black dorsal stripe) 55

– Coloration more uniform, though sometimes with scattered small spots on the body or legs (abdomen without a dark brown or black dorsal stripe) 56

55 Colour pattern very characteristic, as in Fig. 35. *Rs* of the fore wings well separated from *MA* ***MERUTERRANA*** Sjöstedt (p. 98)

– Colour pattern not as in Fig. 35. *Rs* of the fore wings usually fused for part of its length with *MA* . . . . ***DIONCOMENA*** Brunner (p. 122)

56 *R* of the forewings with pectinately arranged posterior branches, none of them branched again (as in Fig. 15, but the number of branches varying and the wing variously shaped) ***DUCETIA*** Stål (p. 105)

– *R* of the fore wings variously branched, but not with a simple pectinate arrangement and with the most proximal branch (*Rs*) bifurcate 57

57 Fore wings at least five times longer than their maximum width. (East Africa) . . . ***PARAPYRRHICIA*** Brunner (p. 159)

– Fore wings less than four times longer than their maximum width. (Not known from East Africa) . . . . ***SYMMETROPLEURA*** Brunner (p. 173)

58 Pronotum with a black band across the hind margin of the disc; fore wings with a black band straddling *MA* (the male – see Fig. 33 – has extensive black markings elsewhere, but the black markings of the female are less extensive). Male mid tibiae with a conspicuously enlarged internal subapical spur . . . . ***PRONOMAPYGA*** Rehn (p. 96)

– Pronotum and fore wings not marked in this way. Male mid tibiae without an enlarged subapical spur 59

59 Venation of the costal area of the fore wings conspicuously sparser than that of the remaining areas 60

– Venation of the costal area of the fore wings similar to that of the remaining areas . . 61

60 Fore coxae unarmed. Hind wings not reaching the hind knees . ***KEVANIELLA*** Chopard (p. 119)

– Fore coxae with a spine. Hind wings reaching well beyond the hind knees . . . . ***PHANEROPTERA*** Serville (p. 135)

61 Male subgenital plate with a pair of styles. Ovipositor much reduced, smooth-edged or with a few small teeth at the tip of the dorsal valves . . ***CATOPTROPTERYX*** Karsch (p. 121)

– Male subgenital plate without styles (although sometimes with non-articulated posterior processes). Ovipositor well developed, with teeth or crenulation on both dorsal and ventral valves 62

62 Pronotum with fairly distinct lateral carinae, its surface rugose (at least on the disc) . . ***ECTOMOPTERA*** gen. n. (p. 165)

– Pronotum without lateral carinae, its surface smooth 63

63 Hind tibiae with one or two apical spurs on each side 64

– Hind tibiae with three apical spurs on each side 65

64 Fore wings shiny and translucent . . . . . ***EULIOPTERA*** Ragge (p. 137)

– Fore wings matt and opaque (except for the costal and precostal areas, which are sometimes translucent) . . . . . ***PHANEROPTERA*** Serville (p. 135)

65 Fore wings shiny and translucent 66

– Fore wings matt and opaque 68

66 Fore wings less than 13 mm long in the male, less than 18 mm long in the female . . . ***PHANEROPTERA*** Serville (p. 135)

– Fore wings more than 14 mm long in the male, more than 19 mm long in the female . . 67

67 Cells along the hind margin of the fore wings (beyond the stridulatory region in the male) brown, contrasting with the green colour of the cells in the more anterior part of the wings. Fore wings usually more than five times longer than their maximum width . . . ***EULIOPTERA*** Ragge (p. 137)

– Cells along the hind margin of the fore wings (beyond the stridulatory region in the male) green, similarly coloured to the cells in the more anterior part of the wings. Fore wings usually less than five times longer than their maximum width . . . . ***MELIDIA*** Stål (p. 159)

68 Hind wings extending beyond the fore wings by more than a quarter of the length of the latter ***PHANEROPTERA*** Serville (p. 135)

– Hind wings extending beyond the fore wings by less than a quarter of the length of the latter

69 Hind femora unarmed. Hind tibiae with fewer than 35 external dorsal spines . . ***PHANEROPTERA*** Serville (p. 135)

– Hind femora usually with ventral spinules. Hind tibiae with more than 40 external dorsal spines ***MELIDIA*** Stål (p. 159)

Descriptions of the genera

ATLASACRIS Rehn

(Figs 18, 20)

Atlasacris Rehn, 1914: 153. Type-species: *Atlasacris peculiaris* Rehn, by original designation.

♂. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above, concave in profile. Eyes circular, prominent. Pronotum without lateral carinae, markedly selliform with posterior part of lateral lobes strongly inflated, surface smooth and matt. Fore coxae usually with small spine. Femora

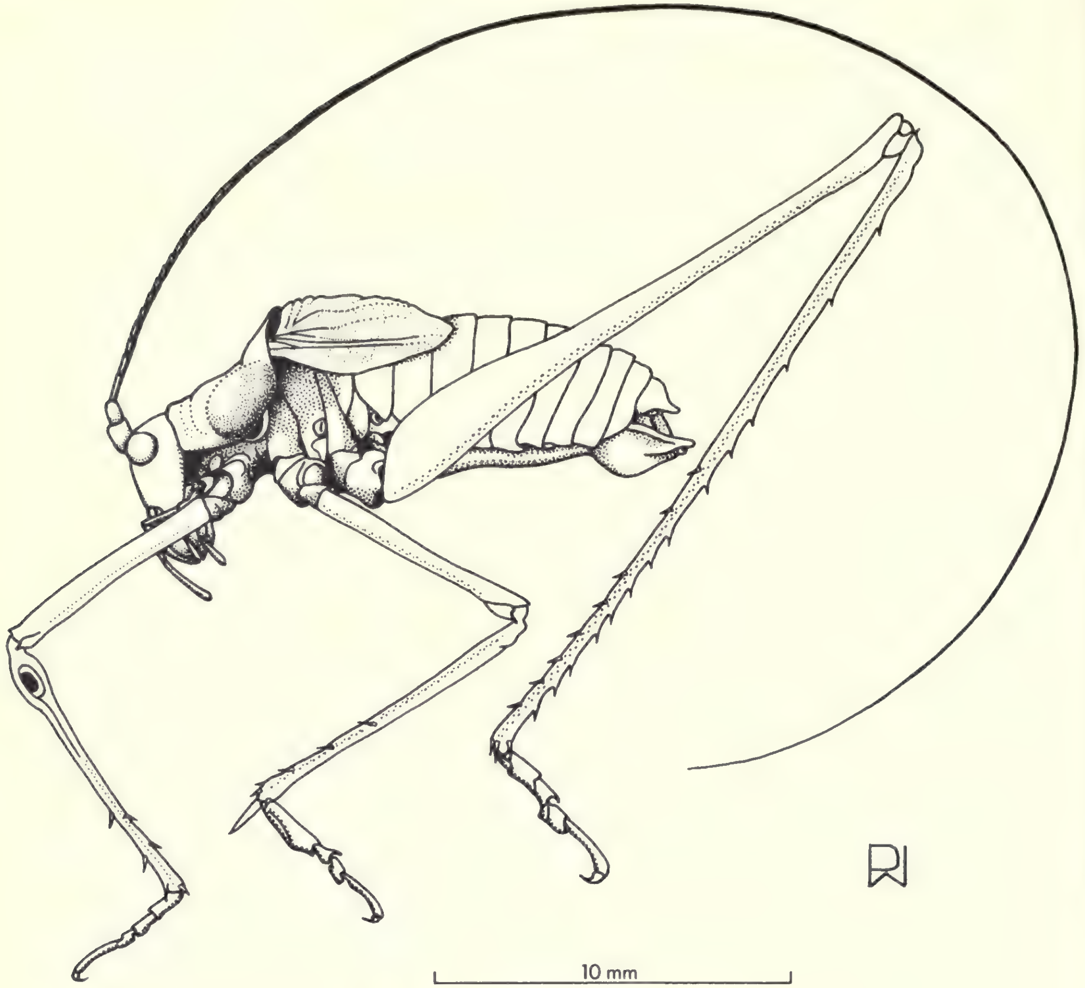


Fig. 18 *Atlasacris peculiaris*, male.

unarmed. Fore tibiae with open tympanum on each side; dorsal spurs present, or absent except at apex. Mid tibiae without dorsal spurs except at apex; ventral internal apical spur greatly enlarged, almost straight (Fig. 20). Hind tibiae with three apical spurs on each side. First tarsal segment of mid legs greatly enlarged, more than twice as long as that of fore legs (Fig. 20). Fore wings reduced to short lobes. Hind wings vestigial. Tenth abdominal tergite slightly enlarged, with produced posterolateral angles. Subgenital plate without styles.

♀ unknown.

DISCUSSION. The males of *Atlasacris* are almost unique among the African Phaneropterinae in having the first mid tarsal segment much enlarged, clearly in association with the greatly enlarged ventral internal apical spur on the mid tibiae. The only comparable mid leg structure known to me is shown by some species of the related genus *Ivensia*, in which this segment is enlarged in the male but not nearly to the extent shown by *A. peculiaris*. The mid legs of the females, which are as yet unknown, are probably not modified in this way. In comparison with related genera in which at least some of the species are equally brachypterous, *Atlasacris* can be further distinguished from *Ivensia* by the circular eyes, and (in the male) from *Odonturoides* and *Monticolaria* by the strongly inflated posterior part of the lateral lobes of the pronotum.

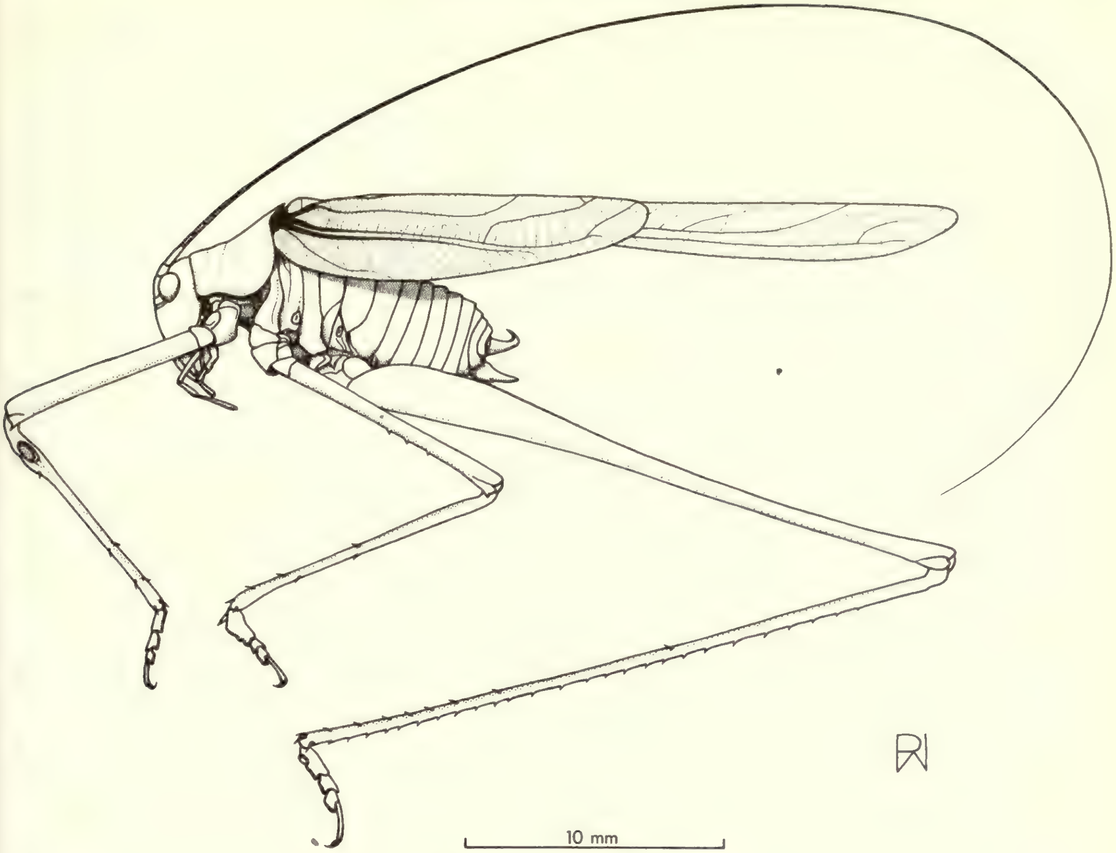


Fig. 19 *Ivensia scaura*, male.

Distribution. The nine males examined (in so far as their data are sufficiently precise) all come from the region of the Albert-Edward-Kivu rift-valley, from Ruwenzori to Burundi.

Included species. *A. peculiaris* Rehn.

IVENSIA Bolívar

Ivensia Bolívar, 1890: 218. Type-species: *Ivensia uncinata* Bolívar, by monotypy.

♂. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above, sometimes concave in profile. Eyes oval, prominent. Pronotum without lateral carinae, surface smooth and matt. Fore coxal spine absent or almost so. Femora unarmed or with few small spinules. Fore tibiae with open tympanum on each side. Fore and mid tibiae with dorsal spurs (except for *I. uncinata*, according to Bolívar, 1890). Mid tibiae with much enlarged internal apical or subapical spur. Hind tibiae with three apical spurs on each side. Fore wings quite well developed, but never reaching hind knees and sometimes (*I. uncinata*) not reaching tip of abdomen; hind wings fully developed or (*I. uncinata*) much reduced. Fore wings shiny and translucent (at least in species described here); *Sc* and *R* usually separate from base, but sometimes (*I. scaura*) contiguous or almost so in basal half of wing. Tenth abdominal tergite unmodified. Subgenital plate without styles but sometimes with style-like processes.

♀ unknown (but see below).

Discussion. The shape and position of the enlarged internal spur on the mid tibiae enable males of this genus to be distinguished from those of all related genera except *Atlasacris* and *Pronomapyga*, both of which differ from *Ivensia* in having eyes that are circular or almost so, and an enlarged tenth abdominal tergite.

Until now this genus has been based solely on the holotype of *I. uncinata*, collected in Angola and originally deposited in the MLZA, Lisbon. It seems (to judge from Fernandes, 1959) that this specimen was already missing before the insect collections of this Museum were destroyed by fire in March, 1978. Miss V. Llorente has kindly informed me that it is not in the IEE, Madrid, and it seems highly probable that this holotype no longer exists. Males of *I. uncinata* would be quite easy to recognize from Bolívar's description and figures, but none of the male specimens I have examined in the course of this study belong to this species and I have seen none from Angola that could even be congeneric with it. I have, however, examined a number of specimens of previously undescribed species from elsewhere in Africa that are sufficiently similar to *I. uncinata* to be considered, at least for the time being, to belong to *Ivensia*. The males of the four species that are named and described here have much better developed wings than *I. uncinata*, but share with it the enlarged internal spur on the mid tibiae, the oval eyes and the unmodified tenth abdominal tergite.

I have also examined two female specimens, from Mbala, Zambia, and Dodoma, Tanzania, which quite possibly belong to *Ivensia* but which do not seem to be conspecific with any of the males examined. These specimens, which are both in the BMNH collection, are very brachypterous (the fore wings not reaching the hind margin of the second abdominal tergite) and have well developed ovipositors with fine teeth.

DISTRIBUTION. Known at present only from Angola, Zaire and Tanzania.

Key to the species of *Ivensia*

This key is for males only as females are not yet known in any of the species.

1 Hind wings not extending beyond the fore wings . . . . . . ***I. uncinata*** Bolívar (p. 92)
– Hind wings extending beyond the fore wings 2
2 Hind wings extending beyond the fore wings by less than a third of the length of the latter, not reaching the hind knees . . . . ***I. breviala*** sp. n. (p. 95)
– Hind wings extending beyond the fore wings by at least half the length of the latter, usually reaching at least to the hind knees 3
3 Enlarged internal spur of the mid tibiae arising well back from the tip, as in Fig. 22 ***I. longispina*** sp. n. (p. 94)
– Enlarged internal spur of the mid tibiae arising at or very near the tip, as in Figs 21 or 23 . 4
4 First segment of the mid tarsi noticeably enlarged, as in Fig. 21. Subgenital plate shaped as in Fig. 29 . . . . ***I. scaura*** sp. n. (p. 93)
– First segment of the mid tarsi not enlarged (Fig. 23). Subgenital plate shaped as in Fig. 31 ***I. parva*** sp. n. (p. 95)

Ivensia uncinata Bolívar

Ivensia uncinata Bolívar, 1890: 218. Holotype ♂, ANGOLA: Quango (*Capello e Ivens*) (lost – see above).

DIAGNOSIS. ♂. Hind wings not extending beyond fore wings. (According to Bolívar this species lacks the dorsal spurs on the fore and mid tibiae that are present in the remaining species of *Ivensia*; it is impossible to be certain of any other diagnostic characters from the original description.)

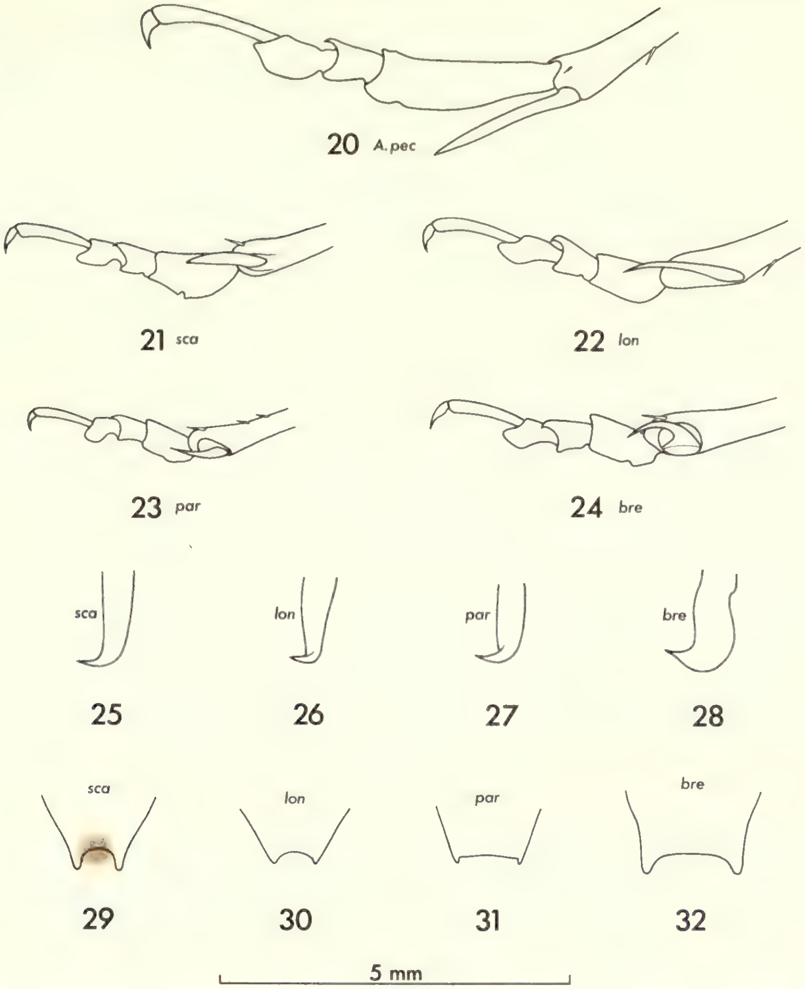
♀ unknown.

MEASUREMENTS (taken from Bolívar, 1890: 218)

	Male
Total length	13
Median length of pronotum	4
Length of hind femur	17
Length of fore wing	7

DISCUSSION. It is clear from the original description and figures that *I. uncinata* may be readily distinguished from the four species described below by the very reduced (possibly vestigial) hind wings, which do not extend beyond the fore wings.

DISTRIBUTION. Known only from the type-locality in Angola.



Figs 20–32 *Atlasacris* and *Ivensia*. 20–24. Inner view of the left male mid tarsus of (20) *A. peculiaris*; (21) *I. scaura*; (22) *I. longispina*; (23) *I. parva*; (24) *I. breviala*. 25–28. Dorsal view of the right male cercus of (25) *I. scaura*; (26) *I. longispina*; (27) *I. parva*; (28) *I. breviala*. 29–32. Ventral view of the male subgenital plate of (29) *I. scaura*; (30) *I. longispina*; (31) *I. parva*; (32) *I. breviala*.

Ivensia scaura sp. n.

(Figs 19, 21, 25, 29)

Diagnosis. ♂. Enlarged internal apical spur of mid tibiae shaped as in Fig. 21. First segment of mid tarsi noticeably enlarged, as in Fig. 21. Hind wings extending beyond fore wings by at least three-quarters length of latter. Cerci shaped as in Fig. 25. Subgenital plate shaped as in Fig. 29.

♀ unknown.

Description. ♂. Pronotum with posterior part of lateral lobes moderately inflated. Femora unarmed or with 1–2 small ventral spinules on fore femora, 1–6 on mid femora and 1 on hind femora. Fore tibiae with 2–3 external ventral spurs. Mid tibiae with 3–5 external ventral spurs, and with enlarged internal apical spur shaped as in Fig. 21. Hind tibiae with about 20–26 external dorsal spines. First segment of mid tarsi noticeably enlarged, as in Fig. 21. *Sc* and *R* of fore wings contiguous or almost so in basal half of wing. Hind wings extending beyond fore wings by at least three-quarters length of latter.

Cerci shaped as in Fig. 25. Subgenital plate shaped as in Fig. 29.

General coloration green, variegated with red-brown, brown and black markings. Front of head marked with red-brown pattern, sometimes conspicuously so; top of head red-brown or with red-brown markings; antennae red-brown with black bands at intervals. Pronotum with broad red-brown stripe along each side of disc and sometimes with red-brown spots. Sides of thorax with red-brown markings. Femora mainly green, becoming brown at tip. Tibiae mainly brown or red-brown with black markings at base; tympana mostly dark brown. Tarsi brown or dark brown. Femoral and tibial spines and spurs with darkened tip. Anterior half of fore wings green, becoming cream at base, posterior half brown; *R* and *M* black at base. Membrane of hind wings darkened, especially distally; exposed part appearing brown when flexed, with paler veins. Abdomen green with red-brown spots and sometimes red-brown markings near base. Cerci darkened at tip.

♀ unknown.

MEASUREMENTS

	Males
Total length	(5): 27·7–29·0, mean 28·24
Median length of pronotum	(5): 3·7–3·9, mean 3·78
Length of hind femur	(5): 21·7–22·3, mean 21·96
Length of fore wing	(5): 11·2–13·4, mean 12·72

DISCUSSION. Males of this species may be easily recognized by the noticeably enlarged first mid tarsal segment and the shape of the enlarged internal mid tibial spur.

MATERIAL EXAMINED

Holotype ♂, **Zambia**: 16 km from Mbala ('Abercorn'), Sizi Forest, Kalambo Falls – Mbala ('Abercorn') road, near Fse Fse barrier, 19.v.1966 (*Jago*) (BMNH).

Paratypes. **Zambia**: 1 ♂, same data and depository as holotype; 1 ♂, Mbala, 16.iv.1950 (*Backlund*) (BMNH); 2 ♂, Mbala, Kalambo, 24.iii.1951 (*FitzGerald*) (BMNH).

DISTRIBUTION. Known only from the vicinity of Mbala in the extreme north of Zambia.

Ivensia longispina **sp. n.**

(Figs 22, 26, 30)

DIAGNOSIS. ♂. Enlarged internal spur of mid tibiae arising well back from tip, shaped as in Fig. 22. First segment of mid tarsi very slightly enlarged, as in Fig. 22. Hind wings extending beyond fore wings by about three-quarters length of latter. Cerci shaped as in Fig. 26. Subgenital plate shaped as in Fig. 30.

♀ unknown.

DESCRIPTION. ♂. Pronotum with posterior part of lateral lobes moderately inflated. Femora unarmed or with 1–2 small ventral spinules. Fore tibiae with 3–4 external ventral spurs. Mid tibiae with 3 external ventral spurs, and with enlarged internal spur arising well back from tip, shaped as in Fig. 22. Hind tibiae with about 21–23 external dorsal spines. First segment of mid tarsi very slightly enlarged, as in Fig. 22. *Sc* and *R* of fore wings separate from base. Hind wings extending beyond fore wings by about three-quarters length of latter.

Cerci shaped as in Fig. 26. Subgenital plate shaped as in Fig. 30.

General coloration green, variegated with red-brown, brown and black markings. Front and top of head marked with brown or red-brown pattern; antennae red-brown with paler bands. Pronotal disc mostly red-brown with large black lateral markings; lateral lobes green. Sides of thorax with red-brown markings. Femora mainly green, becoming red-brown at tip. Fore and mid tibiae red-brown with black markings at base; tympana mostly dark brown. Hind tibiae mostly green, but brownish along dorsal surface. Tarsi dark brown or red-brown. Femoral and tibial spines and spurs with darkened tip. Anterior half of fore wings green, posterior half brown; *M*, and sometimes *R*, black at base. Membrane of hind wings darkened, especially distally; exposed part appearing brown when flexed. Abdomen green with red-brown markings on first two tergites and conspicuous black patch on each side of next five tergites. Cerci darkened at tip.

♀ unknown.

MEASUREMENTS

	Males
Total length	(2): 25·7–25·9, mean 25·80
Median length of pronotum	(2): 3·5–3·5, mean 3·50
Length of hind femur	(2): 16·7–17·5, mean 17·10
Length of fore wing	(3): 12·1–12·1, mean 12·10

DISCUSSION. Males of this species are very similar to those of *I. scaura* in general appearance and coloration, but may be distinguished from the other fully winged species of *Ivensia* by the position and shape of the enlarged internal spur of the mid tibiae. The first mid tarsal segment is very slightly enlarged but not to the extent shown by *I. scaura*.

MATERIAL EXAMINED

Holotype ♂, **Zaire**: Lubumbashi ('Elisabethville'), 9.iv.1921 (ANS, Philadelphia).

Paratypes. **Zaire**: 1 ♂, Lubumbashi, iv.1925 (*Seydel*) (BMNH); 1 ♂, Lubumbashi, vi.1929 (*Seydel*) (MRAC, Tervuren).

DISTRIBUTION. Known only from the type-locality in the extreme south of Zaire.

Ivensia parva sp. n.

(Figs 23, 27, 31)

DIAGNOSIS. ♂. Enlarged internal apical spur of mid tibiae shaped as in Fig. 23. First segment of mid tarsi not enlarged (Fig. 23). Hind wings extending beyond fore wings by slightly more than half length of latter. Cerci shaped as in Fig. 27. Subgenital plate shaped as in Fig. 31.

♀ unknown.

DESCRIPTION. ♂. Pronotum with posterior part of lateral lobes strongly inflated. Femora unarmed. Fore and mid tibiae with 2–3 external ventral spurs; mid tibiae with enlarged internal apical spur shaped as in Fig. 23. Hind tibiae with about 20–26 external dorsal spines. First segment of mid tarsi not enlarged (Fig. 23). *Sc* and *R* of fore wings widely separate from base. Hind wings extending beyond fore wings by slightly more than half length of latter.

Cerci shaped as in Fig. 27. Subgenital plate shaped as in Fig. 31.

General coloration in life probably very similar to that of *I. scaura*, but type-series has been dried after preservation in alcohol and has therefore lost almost all its natural colour. Membrane of hind wings darkened as in *I. scaura* and *I. longispina*.

♀ unknown.

MEASUREMENTS

	Males
Total length	(4): 21·5–24·1, mean 23·25
Median length of pronotum	(4): 2·9–3·7, mean 3·15
Length of hind femur	(3): 16·8–17·2, mean 16·97
Length of fore wing	(3): 13·0–13·1, mean 13·07

DISCUSSION. Males of *I. parva* may be distinguished from those of the other fully winged species of *Ivensia* by their small size, the shape of the enlarged internal spur on the mid tibiae and the shape of the subgenital plate with its small style-like processes.

MATERIAL EXAMINED

Holotype ♂, **Zaire**: Katanga, Kakanda (Mutaka), 15.xii.1953–4.i.1954 (*de Caters*) (MRAC, Tervuren).

Paratypes. **Zaire**: 3 ♂, same data as holotype (1 in BMNH; 2 in MRAC, Tervuren); 1 ♂, Lualaba, Kakanda (Mutaka), xii.1953 (*de Caters*) (MRAC, Tervuren).

DISTRIBUTION. Known only from the type-locality in southern Zaire.

Ivensia breviala sp. n.

(Figs 24, 28, 32)

DIAGNOSIS. ♂. Enlarged internal apical spur of mid tibiae shaped as in Fig. 24. First segment of mid tarsi not enlarged (Fig. 24). *Sc*, *R* and *M* of fore wings sinuously curved; most of fore wing posterior to *Sc* with ladder-like arrangement of cross-veins. Hind wings extending beyond fore wings by less than quarter length of latter. Cerci shaped as in Fig. 28. Subgenital plate shaped as in Fig. 32.

♀ unknown.

DESCRIPTION. ♂. Pronotum with posterior part of lateral lobes strongly inflated. Femora unarmed. Fore tibiae with 3 external ventral spurs. Mid tibiae with 4–5 external ventral spurs, and with enlarged internal apical spur shaped as in Fig. 24. Hind tibiae with about 15–18 external dorsal spines. First segment of mid tarsi not enlarged (Fig. 24). *Sc* and *R* of fore wings widely separated from base; *Sc*, *R* and *M* sinuously curved; most of fore wing posterior to *Sc* with ladder-like arrangement of cross-veins. Hind wings extending beyond fore wings by less than quarter length of latter.

Cerci shaped as in Fig. 28. Subgenital plate shaped as in Fig. 32.

General coloration in life probably very similar to that of *I. scaura*, but type-specimens have lost almost all of their green colouring. Colouring of head, antennae, thorax, legs, abdomen and cerci as in *I. scaura*, except that red-brown marking on pronotum is more extensive, covering most of disc. Fore wings largely green, but with membrane of posterior half brown and with black markings at base of stridulatory region.

♀ unknown.

MEASUREMENTS

	Males
Total length	(2): 18·1–19·7, mean 18·90
Median length of pronotum	(2): 4·0–4·1, mean 4·05
Length of hind femur	(2): 18·8–18·9, mean 18·85
Length of fore wing	(2): 12·6–13·0, mean 12·80

DISCUSSION. The strongly sinuous principal veins of the fore wings and the ladder-like arrangement of cross-veins between them enable males of this species to be easily recognized. The shortened hind wings and comparatively thick cerci are also characteristic.

MATERIAL EXAMINED

Holotype ♂, **Tanzania**: Ufipa, Malonje, 8.iv.1951 (*FitzGerald*) (BMNH).

Paratypes. **Tanzania**: E. of Sumbawanga, Mbisi Forestry Reserve, 26.v.1966 (*Jago*) (BMNH).

DISTRIBUTION. Known only from the above localities very near each other on the Fipa Plateau in south-western Tanzania, where this species may perhaps be endemic.

PRONOMAPYGA Rehn

(Fig. 33)

Pronomapyga Rehn, 1914: 171. Type-species: *Pronomapyga grandis* Rehn, by original designation.

♂♀. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above. Eyes circular or almost so, prominent. Pronotum without lateral carinae, surface smooth and matt. Fore coxae without spine. Femora unarmed. Fore tibiae with open tympanum on each side. Fore and mid tibiae without dorsal spurs except at apex. Male mid tibiae with much enlarged internal subapical spur. Hind tibiae with three apical spurs on each side. Both pairs of wings well developed. Fore wings matt or slightly shiny, opaque. Most of male fore wings with ladder-like arrangement of cross-veins; *Sc* and *R* of male fore wing separated near base, then becoming contiguous for short distance before separating again. Fore wings of single known female showing similar tendencies, but *Sc* and *R* never becoming quite contiguous. Male tenth abdominal tergite much enlarged and produced posteriorly; female tenth abdominal tergite also enlarged. Male subgenital plate without styles. Ovipositor well developed, with fine teeth.

DISCUSSION. Males of *Pronomapyga* share with *Ivensia* the much enlarged internal subapical spur on the mid tibiae but differ from that genus in having almost circular eyes, an enlarged tenth abdominal tergite and fore wings that extend well beyond the hind knees. The female sex is known from only one specimen, the holotype of *P. graueri*; the fore wings of this specimen are less well developed than those of the males of *P. grandis*, but show some tendency towards similar venational features. When further material becomes available this female may well prove to be conspecific with the holotype of *P. grandis*.

DISTRIBUTION. The only specimens I have examined that have precise data are three males, two from Kigezi province, Uganda (Kabale and Mafuga Forest), and the other from Rwankuba (Kisenyi), 2200 m, in nearby Rwanda.

INCLUDED SPECIES. *P. grandis* Rehn, *P. graueri* Rehn.

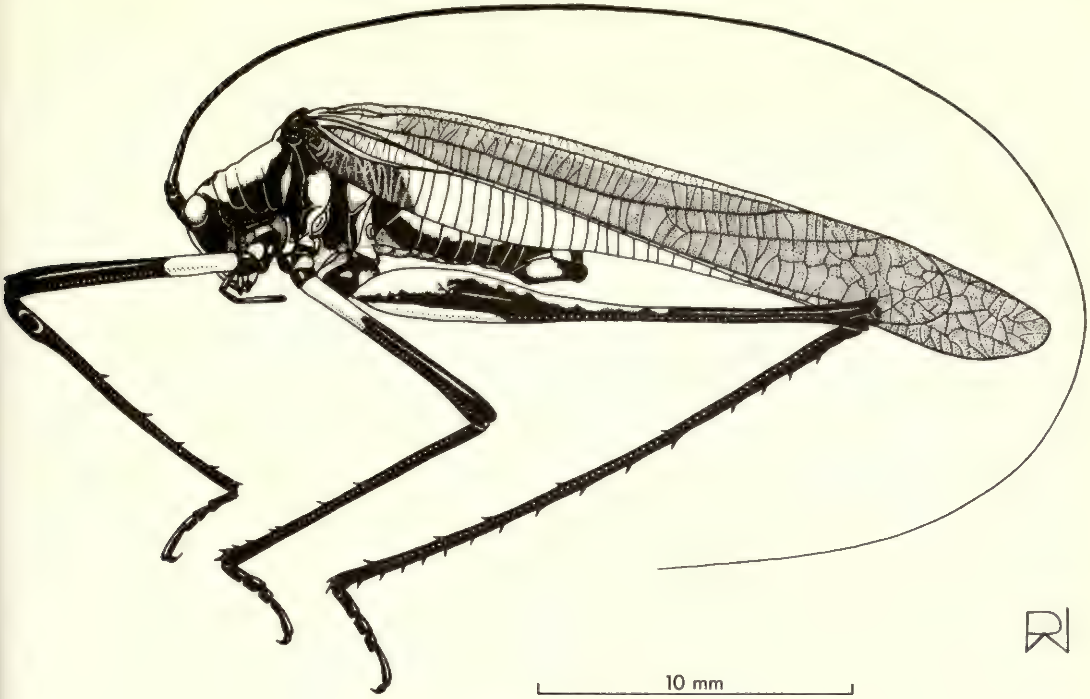


Fig. 33 *Pronomapyga grandis*, male.

MONTICOLARIA Sjöstedt

(Fig. 34)

Monticolaria Sjöstedt, 1909: 128. Type-species: *Monticolaria meruensis* Sjöstedt, by subsequent designation (Ragge, 1968: 90).

♂♀. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above. Eyes circular, prominent. Pronotum without lateral carinae, surface rather rugose, matt or slightly shiny. Fore coxae without spine. Femora unarmed. Fore tibiae with open tympanum on each side. Fore tibiae with dorsal spurs. Mid tibiae with or without dorsal spurs, in addition to apical ones; male mid tibiae with two internal apical spurs, ventral one much enlarged and curved upwards. Hind tibiae with three apical spurs on each side. Fore wings much reduced, not or scarcely reaching tip of abdomen. Hind wings vestigial. Male tenth abdominal tergite unmodified. Male subgenital plate without styles. Oviposter well developed, with fine teeth.

Discussion. Males of *Monticolaria* may be distinguished from related brachypterous genera by the shape of the much enlarged ventral internal apical spur on the mid tibiae. Males of the fully winged genus *Meruterrana* have a similar spur, also curved upwards and over the first tarsal segment, but in that genus the male mid tibiae have an additional ventral internal apical spur and the hind femora have ventral spinules. The females differ from those of *Odonturoides* in having fine teeth on the ovipositor; the female sex is not yet known in the only other related brachypterous genus, *Atlasacris*.

The two included species *M. meruensis* and *M. kilimandjarica* differ mainly in the length of the fore wings and may be variants of a single species. The female of *M. kilimandjarica* has hitherto been unknown, but there is a female specimen in the IEE, Madrid, from Kilimanjaro that clearly belongs to this species; it closely resembles the females of *M. meruensis*, but the fore wings are longer (6–7 mm).

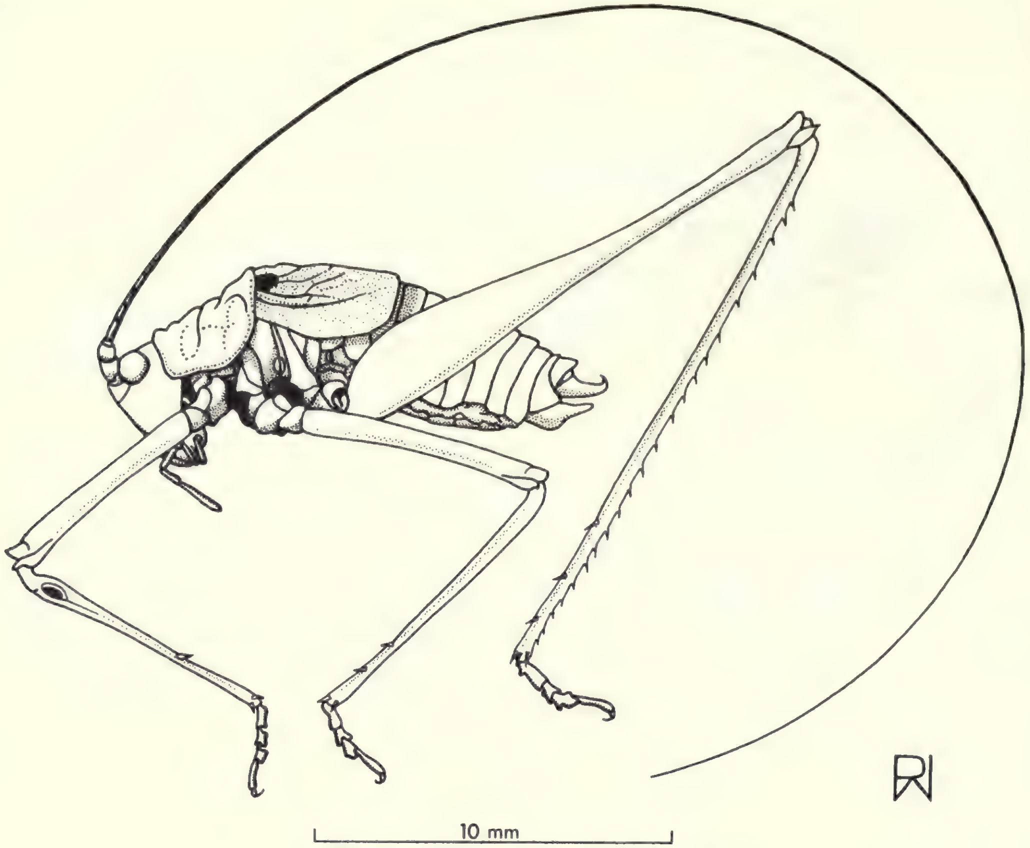


Fig. 34 *Monticolaria meruensis*, male.

Distribution. In addition to material from the vicinity of Meru and Kilimanjaro, there is a male specimen of *M. meruensis* in the BMNH from east of Twali Forest Reserve, near Lake Manyara, Arusha province, Tanzania. The known range of *Monticolaria* is at present limited to these highland areas of northern Tanzania.

Included species. *M. kilimandjarica* Sjöstedt, *M. meruensis* Sjöstedt.

MERUTERRANA Sjöstedt

(Fig. 35)

Meruterrana Sjöstedt, 1912: 10. Type-species: *Meruterrana elegans* Sjöstedt, by monotypy.

♂♀. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above. Eyes almost circular, prominent. Pronotum without lateral carinae, surface smooth and shiny. Fore coxae without spine. Fore and mid femora unarmed; hind femora with ventral spinules. Fore tibiae with open tympanum on each side. Fore tibiae with dorsal spurs but mid tibiae without dorsal spurs except at apex. Male mid tibiae with three internal apical spurs, middle one much enlarged and curved upwards. Hind tibiae with three apical spurs on each side. Both pairs of wings fully developed. Fore wings shiny, with translucent archedictyon; *Sc* and *R* separate from base. Male tenth abdominal tergite unmodified. Male subgenital plate without styles. Oviposter well developed, with fine teeth.

Discussion. Males of *Meruterrana* share with *Odonturoides* the three internal apical spurs on the mid tibiae, but differ from that genus in that the middle of these spurs is much enlarged and the other two unmodified. In comparison with related fully winged genera, both sexes differ from

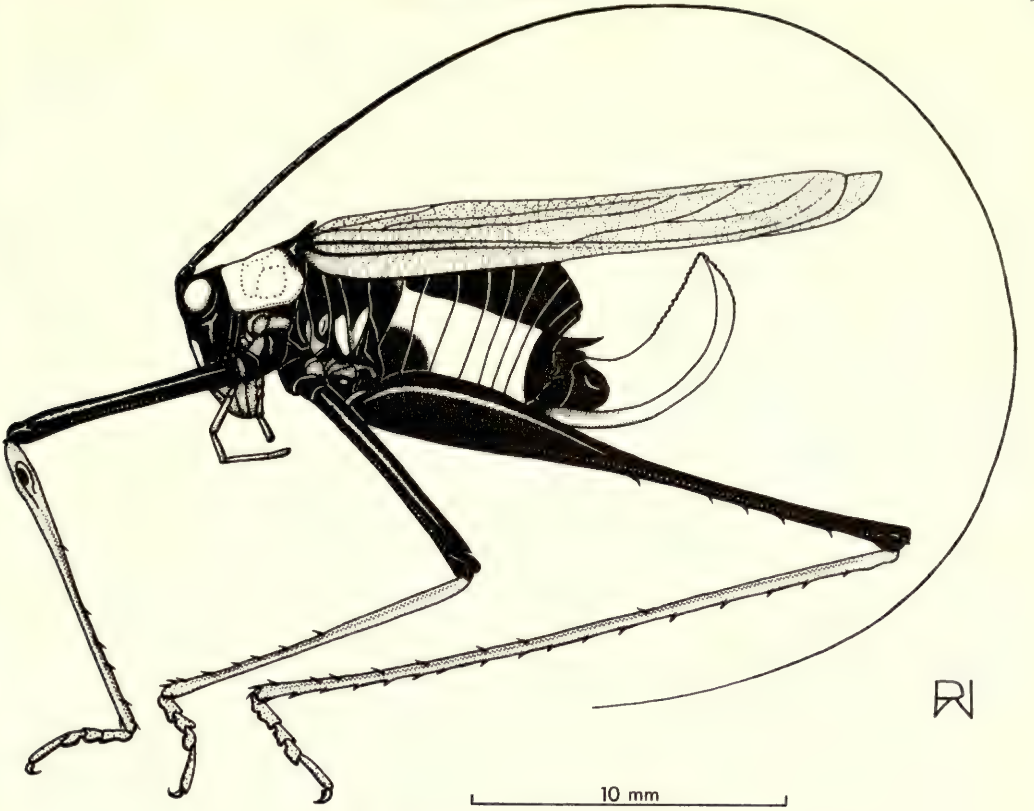


Fig. 35 *Meruterrana elegans*, female.

Ivensia in having almost circular, rather than oval, eyes, and from *Pronomapyga* in having shiny fore wings with translucent archedictyon; the striking variegated colour pattern, black and orange in dried specimens, is also characteristic of the only known species.

DISTRIBUTION. This genus was described from 'Britisch Ostafrika: Mount Meru', which I assumed at the time of my 1968 paper to be Mount Meru in Tanzania. However, at the time of Sjöstedt's paper (1912) Mount Meru was in German East Africa, and all the specimens of *M. elegans* in the BMNH (3 ♂, 3 ♀) are from Meru in Kenya; I am therefore now convinced that the type-locality of *M. elegans* is Meru in Kenya and not Mount Meru in Tanzania. If this is so, the genus is known only from the type-locality in Kenya.

INCLUDED SPECIES. *M. elegans* Sjöstedt.

ODONTUROIDES gen. n.

Type-species: *Odontura plasoni* Ebner.

♂♀. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above. Eyes oval or circular, prominent. Pronotum without lateral carinae, surface smooth and matt; lateral lobes longer than deep. Fore coxae with small spine or unarmed. Fore and mid femora unarmed; hind femora usually with ventral spinules. Fore tibiae with open tympanum on each side. Fore and mid tibiae with dorsal spurs. Male mid tibiae with three internal apical spurs, of which at least two are modified (Figs 37–39). Hind tibiae with three apical spurs on each side. Fore wings much reduced, not reaching tip of abdomen. Hind wings vestigial or absent in male, absent in female. Male tenth abdominal tergite unmodified or almost so. Male subgenital plate without styles. Ovipositor well developed, with coarse teeth.

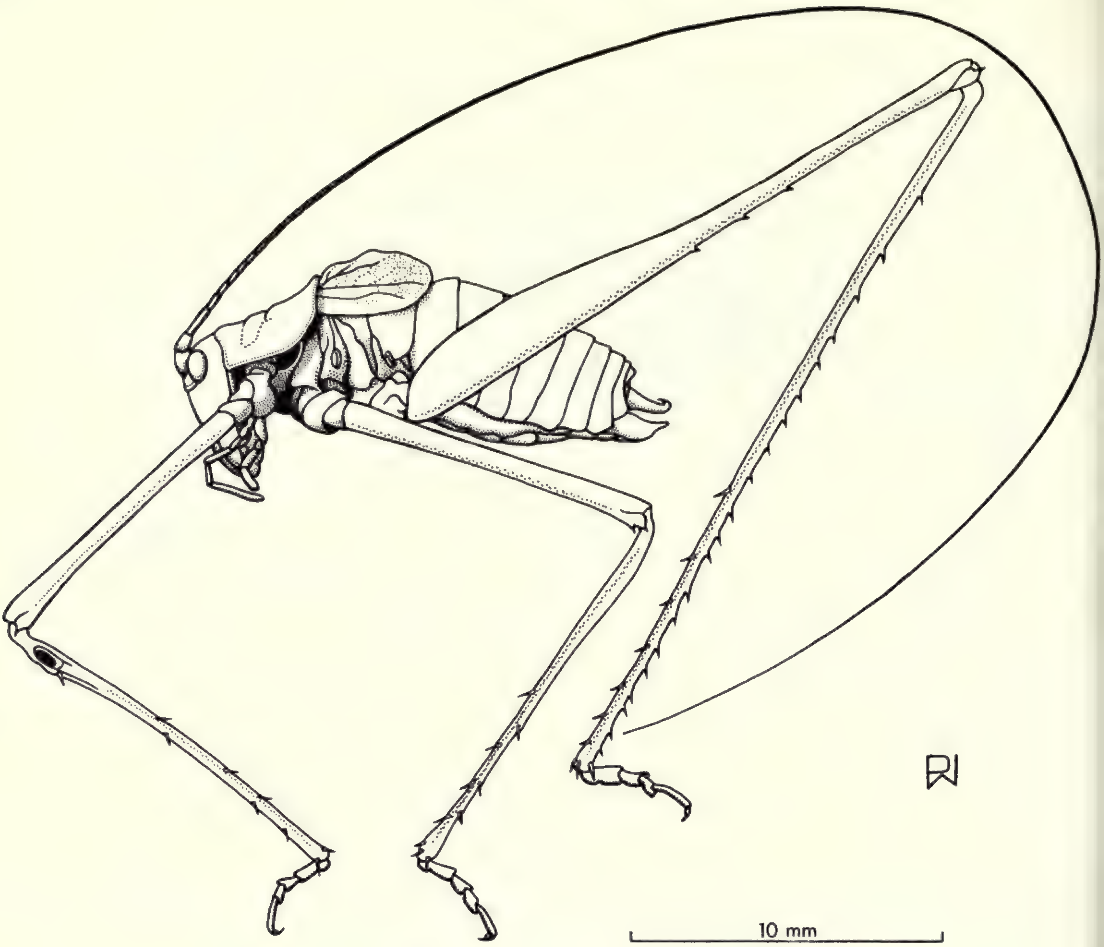


Fig. 36 *Odonturoides plasoni*, male.

DISCUSSION. *Odonturoides* is superficially very similar to *Odontura*, which, as interpreted in this work, is not known from tropical Africa. It differs from *Odontura* in having three apical spurs on each side of the hind tibiae, and usually ventral spinules on the hind femora; the males also differ from *Odontura* in having three (rather than two) internal apical spurs on the mid tibiae, of which at least two are modified in some way. The three internal apical spurs of the male mid tibiae also distinguish *Odonturoides* from the related East African brachypterous genera *Atlasacris* and *Monticolaria*; the females may be distinguished from *Monticolaria* by the coarsely toothed ovipositor.

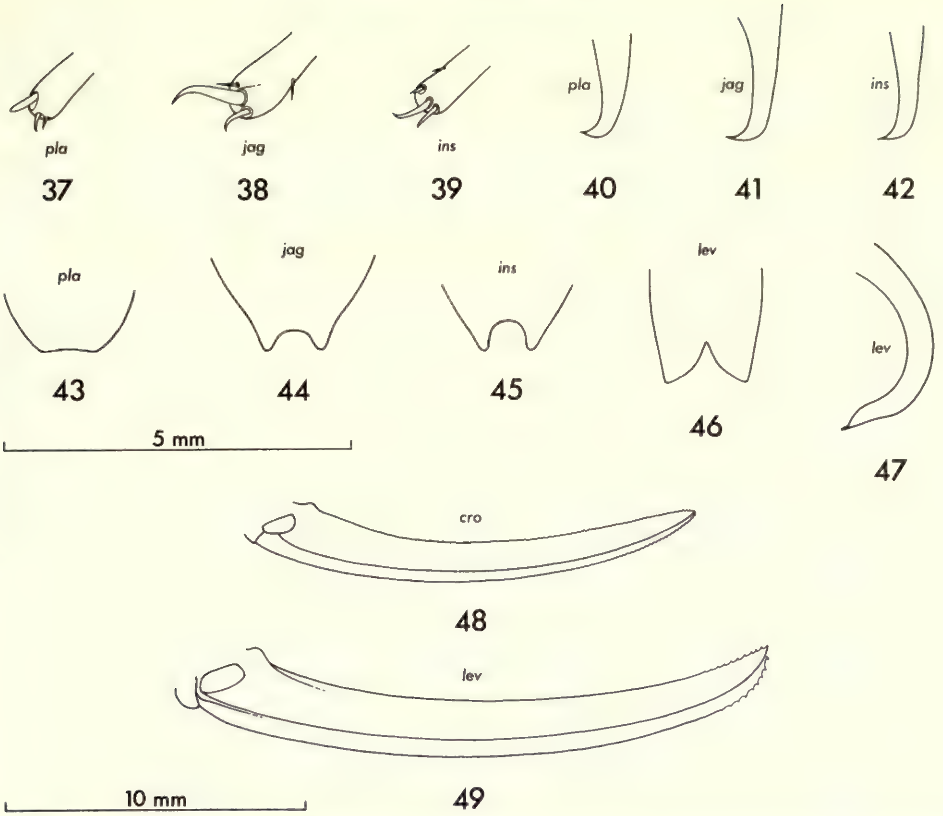
The three species that I have here included in *Odonturoides*, though all brachypterous and superficially similar, are not very uniform and may later be considered to represent more than one genus. However, so little material of these species is at present available that I have thought it wiser to treat them as a single genus for the time being.

DISTRIBUTION. East Africa, from central Tanzania to northern Zambia and Malawi.

Key to the species of *Odonturoides*

Males

1 Dorsal internal apical spur of the mid tibiae flattened and rounded at the tip; the remaining two internal apical spurs smaller and arranged as in Fig. 37. Subgenital plate shaped as in Fig. 43
O. plasoni (Ebner) (p. 102)



Figs 37–49 *Odonturoides* and *Ducetia*. 37–39. Inner view of the apex of the left male mid tibia of (37) *O. plasoni*; (38) *O. jagoi*; (39) *O. insolitus*. 40–42. Dorsal view of the right male cercus of (40) *O. plasoni*; (41) *O. jagoi*; (42) *O. insolitus*. 43–46. Ventral view of the male subgenital plate of (43) *O. plasoni*; (44) *O. jagoi*; (45) *O. insolitus*; (46) *D. levatiala*. 47. Dorsal view of the right male cercus of *D. levatiala*. 48, 49. Lateral view of the ovipositor of (48) *D. crosskeyi* and (49) *D. levatiala*.

– Dorsal internal apical spur of the mid tibiae normal or almost so, pointed at the tip; the remaining two internal apical spurs enlarged, as in Figs 38 or 39. Subgenital plate shaped as in Figs 44 or 45 2
2 Fore wings strongly convex, at least twice as long as the pronotum; hind wings absent . . **_O. jagoi_** sp. n. (p. 102)
– Fore wings not strongly convex, about as long as the pronotum; hind wings extending beyond the fore wings . . . . **_O. insolitus_** sp. n. (p. 103)

Females

1 Fore wings overlapping 2
– Fore wings not overlapping . . . . **_O. jagoi_** sp. n. (p. 103)
2 Fore and mid femora unarmed; hind femora with fewer than six ventral spinules or unarmed **_O. plasoni_** (Ebner) (p. 102)
– Fore and mid femora with ventral spinules; hind femora with more than six ventral spinules . **_O. insolitus_** sp. n. (p. 102)

Odonturoides plasoni (Ebner) **comb. n.**

(Figs 36, 37, 40, 43)

Odontura plasoni Ebner, 1915: 419. LECTOTYPE ♂, TANZANIA: Tosamaganga ('Tassamaganga') (NM, Vienna), here designated [examined].

DIAGNOSIS. ♂♀. Eyes oval. Hind femora usually with few small ventral spinules. Dorsal internal apical spur of male mid tibiae flattened and rounded at tip; remaining two internal apical spurs smaller and arranged as in Fig. 37. Female fore wings overlapping. Female cerci bluntly rounded at tip. Male subgenital plate shaped as in Fig. 43.

MEASUREMENTS

	Males	Females
Total length	(6): 12·3–16·2, mean 14·68	(3): 12·9–17·7, mean 15·93
Median length of pronotum	(6): 3·2–3·9, mean 3·58	(3): 3·6–3·8, mean 3·70
Length of hind femur	(6): 18·8–21·4, mean 20·33	(3): 17·4–18·8, mean 18·07
Length of fore wing	(7): 3·4–3·9, mean 3·64	(3): 1·4–1·7, mean 1·53
Length of ovipositor		(3): 6·4–6·8, mean 6·67

DISCUSSION. *O. plasoni* differs from *O. jagoi* and *O. insolitus* in that the dorsal internal apical spur of the male mid tibiae is flattened and rounded at the tip. The females differ from *O. jagoi* in having overlapping fore wings and from *O. insolitus* in having unarmed fore and mid femora. The eyes are clearly oval in both sexes, whereas they are circular in *O. jagoi* and only slightly oval in *O. insolitus*.

The only syntype of *O. plasoni* that I have been able to examine is a male kindly sent to me by Dr A. Kaltenbach of the NM, Vienna. Dr Kaltenbach believes the remaining syntypes (2 ♂, 1 ♀) to be lost. As *O. plasoni* is now a type-species I am here designating this male specimen as a lectotype; it bears the data 'Tassamaganga D. O. Afr.', Ebner's determination label and a red 'paratype' label, and I have now clearly labelled it as a lectotype.

MATERIAL EXAMINED

Lectotype ♂, **Tanzania**: Tosamaganga ('Tassamaganga') (*Plason*) (NM, Vienna).

Tanzania: 5♂, 3♀, 26 km NW. of Sumbawanga, Nkundi Plantation, 24–27.v.1966 (*Jago*) (BMNH); 1♂, 3 km E. of Sumbawanga, Mbisi Forest Track, 28.v.1966 (*Jago*) (BMNH).

DISTRIBUTION. The type-series of *O. plasoni* came from 'Tassamaganga' (now Tosamaganga) in the Udzungwa mountain range, Iringa province, Tanzania; the remaining specimens examined were collected from the Fipa Plateau. These two mountain ranges thus represent the known distribution of the species at present.

Odonturoides jagoi **sp. n.**

(Figs 38, 41, 44)

DIAGNOSIS. ♂. Eyes circular or almost so. Hind femora unarmed (but see Discussion below). Internal apical spurs of mid tibiae arranged as in Fig. 38, middle one greatly enlarged. Fore wings strongly convex, so that most of membrane is lifted well above dorsal surface of body. Subgenital plate shaped as in Fig. 44.

♀ unknown (but see Discussion below).

DESCRIPTION. ♂. Eyes circular or almost so.

Fore coxae with small spine. Femora unarmed (but see Discussion below). Fore and mid tibiae each with about 3–5 external ventral spurs. Internal apical spurs of mid tibiae arranged as in Fig. 38, middle one greatly enlarged. Hind tibiae with about 13–18 external dorsal spines. Fore wings strongly convex, so that most of membrane is lifted well above dorsal surface of body; veinlets in costal area markedly thickened. Hind wings absent.

Tenth abdominal tergite somewhat emarginate towards centre. Cerci shaped as in Fig. 41. Subgenital plate shaped as in Fig. 44.

General coloration green. Eyes, knees and (usually) tarsi brown. Antennae with basal two segments orange-brown, next segment dark brown or black with paler tip, following few segments becoming paler, remaining segments pale brown. Thickened veinlets in costal area conspicuously pale creamish. Enlarged internal apical spurs of mid tibiae mostly dark brown. Cerci darkened at tip.

♀ unknown (but see below).

MEASUREMENTS

	Males
Total length	(6): 12·6–15·4, mean 13·53
Median length of pronotum	(6): 2·4–2·8, mean 2·63
Length of hind femur	(6): 15·9–19·1, mean 17·30
Length of fore wing	(6): 6·2–6·9, mean 6·53

DISCUSSION. The males of this species may be easily recognized by the strongly convex fore wings, which are also relatively much larger than those of the other two species of *Odonturoides*.

There is one female specimen in the BMNH with identical data to the males of the type-series, but I believe it to be a last-instar nymph and have therefore excluded it from the type-series and not used it as the basis for a description of the female sex. It agrees with the description of the male except for the fore wings, mid tibiae and genitalia. The fore wings are extremely small lateral lobes and are more likely to be nymphal wing-pads. This view is confirmed by the larger fore wings of the females mentioned below.

In addition to the type-series there are four male specimens in the BMNH that may be variants of the same species. In all of them there are ventral spinules on the hind femora, and the middle of the three internal apical spurs on the mid tibiae is much less enlarged; some of them also show small differences in the fore wings. These specimens come from south-west of Rungwe Mountain, Tanzania (1 ♂), Mbisi ('Mbizi') in Ufipa province, Tanzania (2 ♂), and Misumu, Mughesse Forest, in northern Malawi (1 ♂). Associated with these male specimens are three females, also with ventral spinules on the hind femora (and also excluded from the type-series). One, from east of Sumbawanga, Mbisi Forest Reserve, is probably conspecific with the male from Mbisi. The other two are from different parts of the Nyika Plateau, Malawi, and may well be conspecific with the Malawian males.

In all three female specimens the fore wings are much larger than those of the putative female nymph mentioned above, but they do not overlap. The ovipositor is similar to those of *O. plasoni* and *O. insolitus*; the cerci are more sharply pointed than those of *O. plasoni* and relatively longer than in both the other species of the genus.

MATERIAL EXAMINED

Holotype ♂, **Tanzania**: Rungwe Mt, Kiwira Forestry Station, 3.vi.1966 (*Jago*) (BMNH).

Paratypes. **Tanzania**: 5 ♂, same data and depository as holotype.

DISTRIBUTION. Although the type-series comes from only one locality, Rungwe Mountain, the further material discussed above suggests that the species may well also occur further west on the Fipa Plateau and also on the Nyika Plateau in northern Malawi.

***Odonturoides insolitus* sp. n.**

(Figs 39, 42, 45)

DIAGNOSIS. ♂♀. Eyes slightly oval. Hind femora with ventral spinules. Internal apical spurs of male mid tibiae arranged as in Fig. 39. Male hind wings extending beyond fore wings, apparently with glandular hairs towards tip; female fore wings overlapping. Female cerci slender at tip but not pointed. Male subgenital plate shaped as in Fig. 45.

DESCRIPTION. ♂. Eyes slightly oval.

Fore coxae unarmed. Femora with ventral spinules. Fore tibiae with 4 external ventral spurs. Mid tibiae with 5–6 external ventral spurs; internal apical spurs arranged as in Fig. 39. Hind tibiae with about 22–27 external dorsal spines. Fore wings not reaching hind margin of second abdominal tergite. Hind wings extending beyond fore wings, reaching hind margin of second abdominal tergite, apparently with glandular hairs towards tip.

Tenth abdominal tergite somewhat emarginate towards centre. Cerci shaped as in Fig. 42. Subgenital plate shaped as in Fig. 45.

General coloration green. Eyes, knees, tarsi and hind tibiae brown. Second segment of antennae pale orange-brown, third segment pale orange-brown at base becoming dark brown at tip, remaining segments dark brown [distal part missing from only male known]. Femoral and tibial spines and spurs brown or brown-tipped. Cerci with dark brown tip.

♀. As male except for fore wings, mid tibiae, genitalia and coloration. Fore wings reduced to small overlapping flaps not reaching hind margin of first abdominal tergite. Cerci slender at tip but not sharply pointed. Knees with brown markings, but not entirely brown as in male. Tarsi green. Ovipositor green with dark-tipped teeth. Coloration otherwise as in male; in one female antennae are complete and become paler towards tip.

MEASUREMENTS

	Male	Females
Total length	13·1	(2): 15·5–18·1, mean 16·80
Median length of pronotum	3·1	(2): 3·8–3·9, mean 3·85
Length of hind femur	20·1	(2): 18·8–19·1, mean 18·95
Length of fore wing	3·1	(2): 1·6–1·8, mean 1·70
Length of ovipositor		(2): 5·0–5·1, mean 5·05

DISCUSSION. The male of *O. insolitus* may be easily recognized by the curious hind wings, which extend beyond the fore wings and reach the hind margin of the second abdominal tergite. Their exposed parts bear hairs which may well be glandular, perhaps producing an attractant for use during courtship and copulation.

For recognition of the females, see under *O. plasoni.*

MATERIAL EXAMINED

Holotype ♂, **Tanzania**: 70 km N. of Dodoma, dry *Acacia* woodland, 16.vi.1969 (*Jago*) (BMNH).

Paratypes. **Tanzania**: 2 ♀, same data and depository as holotype.

DISTRIBUTION. Known only from the type-locality in central Tanzania.

ODONTURA Rambur

Odontura Rambur, 1838: 44. Type-species: *Barbitistes glabricauda* Charpentier, by subsequent designation (Kirby, 1906: 386); according to Uvarov (1948: 379) this name, based on a male without abdomen and two female nymphs, is a nomen dubium.

♂♀. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above. Eyes oval, prominent. Pronotum without lateral carinae, surface smooth and matt; lateral lobes longer than deep. Fore coxae without spine. Femora unarmed. Fore tibiae with open tympanum on each side. Fore and mid tibiae with dorsal spurs. Hind tibiae with two apical spurs on each side. Fore wings reduced to stridulatory organ in male and to short lobes in female. Hind wings vestigial in male, absent in female. Male tenth abdominal tergite unmodified. Male subgenital plate without styles. Ovipositor well developed, with coarse teeth.

DISCUSSION. *Odontura* differs from *Odonturoides* and related brachypterous genera in having two (rather than three) apical spurs on each side of the hind tibiae and, in the male, unmodified internal apical spurs on the mid tibiae.

There seem to be no clear-cut and constant characters distinguishing both sexes of *Odontura* from the brachypterous species of *Ducetia*. Males of *Odontura* are always more brachypterous than those of even the shortest-winged species of *Ducetia* known at present, but the females of several species of *Ducetia* are as brachypterous as those of *Odontura*. The female of *D. crosskeyi* has a long, finely crenulate ovipositor quite unlike that of any species of *Odontura*, but at least some of the East African species of *Ducetia* have ovipositors of the coarse-toothed type found in *Odontura*. Fortunately the known ranges of these two genera do not at present overlap (see below) and so there should be no difficulty in identifying female specimens of known origin.

Odontura is primarily a North African genus, with a few species occurring in the extreme south of Europe. Its supposed occurrence in the Afrotropical Region has been based on *O. capensis* Walker, described from South Africa, and *O. plasoni* Ebner, described from Tanzania. *O. capensis* is known only from the unique female holotype, which differs from typical *Odontura* in having fairly distinct lateral carinae on the pronotum, a fore coxal spine and three apical spurs on each side of the hind tibiae instead of two. A male in the BMNH from Cape Province is clearly congeneric with this female but is probably a distinct, undescribed species. It is unlikely that *capensis* is correctly placed in *Odontura* and I have not taken it into account in the generic diagnosis, but without further material a definite generic assignment is impossible and I have listed it here for convenience.

O. plasoni I have transferred to *Odonturoides* (p. 99).

DISTRIBUTION (excluding *O. capensis* – see above). North Africa, Iberian Peninsula, Balearic Islands, Sardinia and Sicily.

INCLUDED AFRICAN SPECIES. *O. algerica* Brunner, *O. borrei* Bolívar, *O. brevis* Werner, *O. capensis* Walker, *O. liouvillei* Werner, *O. maroccana* Bolívar, *O. microptera* Chopard, *O. moghrebica* Morales, *O. pulchra* Bolívar, *O. quadridentata* Krauss, *O. spinulicauda* Rambur, *O. stenoxypha* (Fieber), *O. uvarovi* Werner.

DUCETIA Stål

(Figs 15, 46–51)

Ducetia Stål, 1874: 11. Type-species: *Locusta japonica* Thunberg, by monotypy.

Paura Karsch, 1889: 439. Type-species: *Paura biramosa* Karsch, by subsequent designation (Kirby, 1906: 407).

Epiphlebus Karsch, 1896: 325. Type-species: *Epiphlebus crypterius* Karsch, by monotypy. **Syn. n.**

Pseudisotima Schulthess, 1898: 199. Type-species: *Pseudisotima punctata* Schulthess, by monotypy.

Kuwayamaea Matsumura & Shiraki, 1908: 7. Type-species: *Kuwayamaea sapporensis* Matsumura & Shiraki [= *Ducetia chinensis* (Brunner)], by original designation.

Schubotzacris Rehn, 1914: 169. Type-species: *Schubotzacris producta* Rehn [= *Ducetia loosi* Griffini], by original designation. **Syn. n.**

Telaea Bolívar, 1922: 201. Type-species: *Telaea quadripunctata* Bolívar [= *Ducetia punctipennis* (Gerstaecker)], by monotypy.

♂ ♀. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above. Eyes oval, prominent. Pronotum without lateral carinae, surface smooth or slightly rugose, matt or slightly shiny. Fore coxae with small spine or unarmed. Femora usually with ventral spinules. Fore tibiae with open tympanum on each side. Fore and mid tibiae with dorsal spurs. Hind tibiae with two or three apical spurs on each side. Fore wings fully developed, reduced to small lobes or intermediate between these extremes; hind wings fully developed, absent or intermediate between these extremes. Fore wings varying in different species from being matt and opaque to being shiny and translucent; *Sc* and *R* usually separate from base although sometimes closely approximated or even contiguous along part of their length; *R* almost always with pectinately arranged posterior branches (except in brachypterous species). Male tenth abdominal tergite usually enlarged, but sometimes unmodified. Male subgenital plate without styles. Ovipositor well developed, with fine or coarse teeth or crenulation.

DISCUSSION. The fully winged species of this genus may usually be recognized by the pectinately branched radius in the fore wings; there are normally at least three of these branches and sometimes as many as seven. In *D. loosi* and *D. fuscopunctata* the two sexes are similar and both show this characteristic feature of the wing-venation. However, material acquired since my revision of 1961 suggests that the females of most (if not all) of the remaining African species in which the males are fully winged are brachypterous in varying degrees and rather different in appearance from the males. The occurrence of marked sexual dimorphism of this kind has already been established in *D. biramosa* and *D. punctipennis* (Ragge, 1961), and I now have specimens of the hitherto unknown brachypterous female of *D. crosskeyi* (see p. 107). Until female specimens of the remaining African species become available, it will be possible to identify this sex only by association with the males.

Among the other genera treated in this review, *Tropidonotacris*, *Corymeta*, *Bueacola*, *Ectomoptera* and *Milititsa* also have a pectinately branched radius in the fore wings. *Tropidonotacris* may be easily distinguished from *Ducetia* by the median carina on the vertex and pronotum, *Corymeta* by the process from the tenth abdominal tergite, *Bueacola* by the lateral

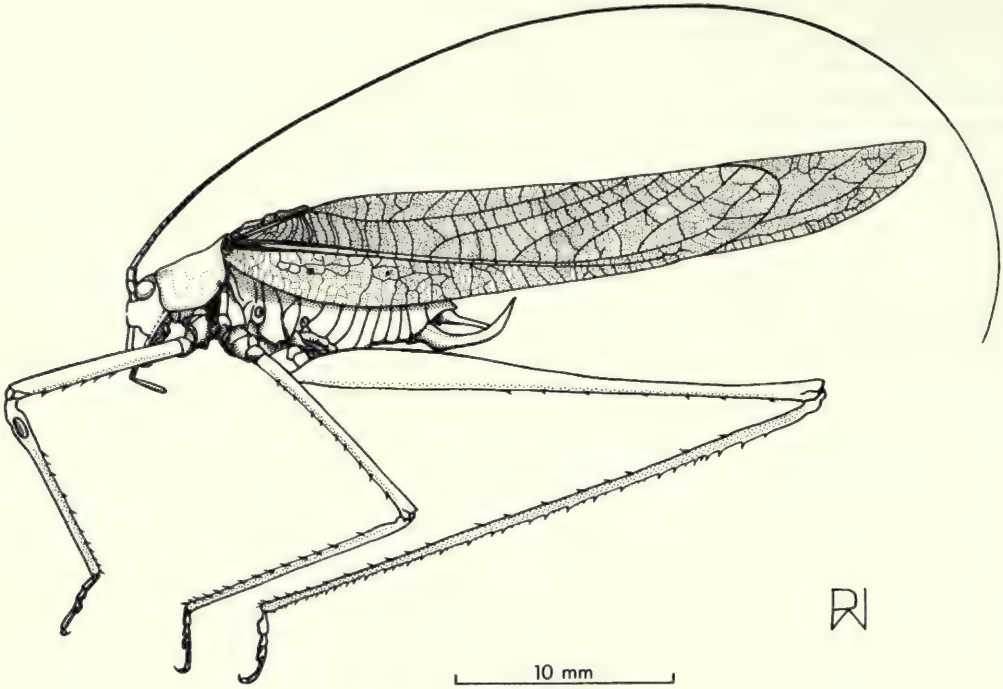


Fig. 50 *Ducetia sagitta*, male.

carinae on the pronotum, and the other two genera by their circular eyes and lack of dorsal spurs (except, sometimes, for the apical one) on the fore and mid tibiae.

The species in which both sexes are brachypterous do not usually show the pectinate branching of the radius and can then be assigned to *Ducetia* only by a combination of other characters. Only one African species of this kind has hitherto been assigned to *Ducetia*: *D. punctata,* which is clearly a close relative of *D. punctipennis*. However, since my revision of 1961 I have seen two specimens of each sex of an undescribed species of *Ducetia* in which the fore wings do not reach the hind knees and the hind wings are vestigial (the radius in the fore wings has three or four pectinate branches); these specimens were collected in the Upemba National Park in southern Zaire and were kindly lent to me by the late Mr V. van Straelen of the (then) Institut des Parcs Nationaux du Congo Belge, Brussels. I also have a single male specimen (on loan from the MRAC, Tervuren) of another undescribed species from Zaire in which the fore wings are further reduced, not reaching the tip of the abdomen. I prefer not to describe these two species until further material is available.

In addition to these brachypterous species from Zaire, I now have material of five further undescribed African species of *Ducetia* in which the males are fully winged. I have females of only one of these species: they are brachypterous and rather different in general appearance from the males. I am waiting for more material of these species before describing them.

The genus *Epiphlebus* was decribed by Karsch in 1896 on the basis of the female holotype (now lost) of the species *crypterius* from Somalia. Schulthess (1898: 197) added a second species, *ruspolii*, again based on a unique Somalian holotype which I have examined. There are two female specimens of *ruspolii* in the BMNH from Ethiopia, and I have 13 further Somalian specimens (on loan from the MZSUS, Florence, and the IZU, Siena) that clearly belong to a related new species (described on p.107). To judge from these specimens there is no character at the generic level to distinguish *Epiphlebus* from *Ducetia*, and I am therefore regarding them here as synonymous.

The synonymy of *Schubotzacris* with *Ducetia* follows from the synonymy of its type-species *S. producta* with *D. loosi* (see p. 109).

DISTRIBUTION. *Ducetia* occurs throughout most of the Afrotropical Region, between latitudes 15°N and 25°S. Outside Africa its range extends through southern Asia to Japan, Indonesia, New Guinea, the Solomon Islands and northern Australia.

INCLUDED AFRICAN SPECIES. *D. biramosa* (Karsch), *D. chelocerca* Ragge, *D. costata* Ragge, *D. crosskeyi* Ragge, *D. crypteria* (Karsch) **comb. n.** (see above), *D. fuscopunctata* Chopard, *D. levatiala* sp. n., *D. loosi* Griffini, *D. macrocerca* Ragge, *D. parva* Ragge, *D. punctata* (Schulthess), *D. punctipennis* (Gerstaecker), *D. ramulosa* Ragge, *D. ruspolii* (Schulthess) **comb. n.** (see above), *D. sagitta* Ragge, *D. vitriala* Ragge.

Additional information that has become available since my 1961 revision is given below, together with the description of the new species *D. levatiala*.

Ducetia crosskeyi Ragge

Ducetia crosskeyi Ragge, 1961: 192.

In 1961 the female sex of this species was unknown, but I now have four female specimens, three from Lamto, Ivory Coast (collected and kindly lent to me by Dr Y. Gillon) and one from Samaru, northern Nigeria; there is also a male specimen from each of these localities and so the two sexes can be easily associated. The pronotum of the females differs in shape from that of the males, and the posterior part of the lateral lobes is not or hardly inflated. The fore wings are reduced to short flaps not reaching the hind margin of the second abdominal tergite; the hind wings are absent. The ovipositor (Fig. 48) is relatively long, gently curved and bluntly crenulate in the distal three-quarters of the dorsal margin and distal half of the ventral margin. There appear to be two colour varieties, one mostly brown and one mostly green. The measurements are as follows (four specimens measured): total length (to tip of abdomen) 17·3–19·7, mean 18·75; median length of pronotum 3·7–3·9, mean 3·75; length of hind femur 19·1–19·8, mean 19·55; length of fore wing 3·5–4·0, mean 3·85; length of ovipositor 13·2–14·1, mean 13·65.

Ducetia fuscopunctata Chopard

Ducetia fuscopunctata Chopard, 1954: 35.

Since my revision of 1961 I have seen material of this species from the Ivory Coast (kindly collected and sent by Dr Y. Gillon) and Liberia (a long series in the ANS, Philadelphia, kindly lent to me by the late Dr H. J. Grant).

Ducetia levatiala **sp. n.**

(Figs 46, 47, 49, 51)

DIAGNOSIS. ♂. Fore wings much reduced, markedly raised up from body, with highly characteristic venation (Fig. 51). Hind wings vestigial. Cerci shaped as in Fig. 47. Subgenital plate shaped as in Fig. 46.

♀. Fore wings reduced to short lobes not reaching hind margin of second abdominal tergite. Hind wings vestigial. Ovipositor over 15 mm long, shaped as in Fig. 49.

DESCRIPTION. ♂. Fore coxae without spine. Fore femora with about 7–10 external ventral spinules. Mid femora with about 11–14 external ventral spinules. Hind femora with about 11–16 external ventral spinules; terminal dorsal point absent. Fore tibiae with about 12–17 external ventral spurs. Mid tibiae with about 16–22 external ventral spurs. Hind tibiae with about 55–100 external dorsal spines and three apical spurs on each side. Fore wings markedly raised up from body, with highly characteristic venation (Fig. 51); *Sc* and *R* contiguous, or at least closely approximated, along part of their length. Hind wings vestigial.

Tenth abdominal tergite unmodified. Cerci shaped as in Fig. 47. Subgenital plate shaped as in Fig. 46.

General coloration green (often yellowish brown in dried specimens). Antennae with dark bands. Fore wings with brown markings in stridulatory region and sometimes with scattered dark brown spots in

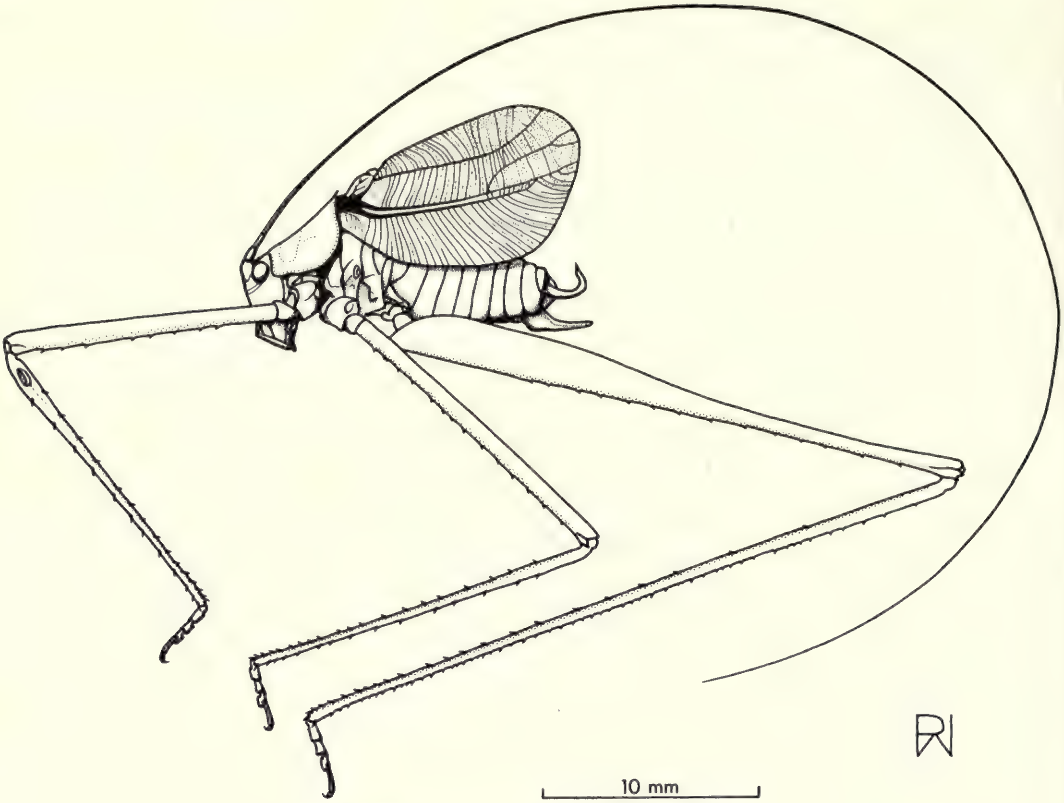


Fig. 51 *Ducetia levatiala*, male.

remaining areas. Femoral spinules brown or black, especially towards tip, sometimes conspicuously so; tibial spines and spurs becoming brown towards tip. Cerci darkened at tip.

♀. As male except for fore wings, genitalia and coloration. Fore wings reduced to short lobes not reaching hind margin of second abdominal tergite. Ovipositor shaped as in Fig. 49, denticulate only near tip. Antennae with conspicuous dark brown markings, especially near base. Fore wings without dark spots (at least in specimens examined). Legs partly or mostly brown, at least in some specimens; mid and hind tibiae with dark brown spot near base on both inner and outer side. Ovipositor mostly green, but teeth with dark brown tip.

MEASUREMENTS

The total length was measured to the tip of the fore wing in the males, but to the tip of the abdomen (excluding the ovipositor) in the females.

	Males	Females
Total length	(6): 15·5–17·7, mean 16·62	(4): 18·7–20·6, mean 19·62
Median length of pronotum	(6): 3·8–4·5, mean 4·17	(4): 5·4–5·5, mean 5·42
Length of hind femur	(7): 23·5–28·8, mean 26·37	(3): 26·9–28·3, mean 27·50
Length of fore wing	(6): 9·7–11·7, mean 10·85	(4): 4·2–4·7, mean 4·35
Length of ovipositor		(4): 16·5–22·6, mean 19·52

DISCUSSION. The raised up position of the fore wings and their highly characteristic venation enable the males of this species to be easily distinguished from those of the other brachypterous species of *Ducetia* in which this sex is known. The long ovipositor distinguishes the females from those of the East African species *D. crypteria, D. ruspolii, D. biramosa* and *D. punctipennis*; females of the two last-mentioned species have, in addition, much larger fore wings than

D. levatiala. The females of *D. vitriala* and *D. parva*, also East African, are not yet known but almost certainly have much shorter ovipositors than *D. levatiala.*

In addition to the type-series I have examined what is almost certainly an advanced nymph of this species from Kurtum Uaro, Somali Republic. The fore wing-pads are raised up above the body more than is usual in Phaneropterine nymphs, so that the vestigial hind wing-pads are completely exposed.

MATERIAL EXAMINED

Holotype ♂, **Somali Republic**: Afgoi [near Mogadiscio], ii–iii.1978 (*Simonetta*) (MZSUS, Florence).

Paratypes. **Somali Republic**: 1 ♂, 1 ♀, same data as holotype (♂ in BMNH; ♀ in MZSUS, Florence); 1 ♂, 2 ♀, Afgoi, iii–iv. 1978 (*Simonetta*) (1 ♂, 1 ♀ in MZSUS, Florence; 1 ♀ in BMNH); 1 ♂, 6 km from Afgoi, 27.iv.1968 (MZSUS, Florence); 2 ♂, [Lower Juba,] Sar Uanle, vii–viii.1975 (1 ♂ in MZSUS, Florence; 1 ♂ in BMNH); 1 ♂, Sar Uanle, 26.vii.1975 (MZSUS, Florence); 1 ♂, Sar Uanle, 13.viii.1975 (MZSUS, Florence); 1 ♀, Mogadiscio, Balad, 23.ix.1964 (IZU, Siena).

DISTRIBUTION. Known only from near the coast of Benadir and Lower Juba provinces of the Somali Republic, but also likely to occur in eastern Kenya.

Ducetia loosi Griffini

Ducetia loosi Griffini, 1908: 204. Holotype ♀, ZAIRE: Popokabaka ('Popocabacca') (IRSNB, Brussels) [examined].

Schubotzacris producta Rehn, 1914: 169. Holotype ♂, ZAIRE: Mboga (MNHU, Berlin) [examined]. **Syn. n.**

The holotype of *Schubotzacris producta* is preserved in alcohol, and is therefore soft and discoloured, but there is no doubt that it belongs to *D. loosi.* The genus *Schubotzacris*, based solely on this specimen, thus becomes a synonym of *Ducetia.*

Ducetia ramulosa Ragge

Ducetia ramulosa Ragge, 1961: 198.

This species was originally described from Zambia, but I have now seen specimens from Malawi, Zaire and Angola.

PEROPYRRHICIA Brunner

Peropyrrhicia Brunner, 1891: 37. Type-species: *Dichopetala massaiae* Bormans, by monotypy.

♂♀. Fastigium of vertex compressed, narrower than first antennal segment, sometimes sulcate above. Eyes circular or almost so, prominent. Pronotum without lateral carinae, surface rugose and usually shiny. Fore coxae without spine. Fore and mid femora unarmed or with ventral spinules. Hind femora with ventral spinules. Fore tibiae with open tympanum on each side. Fore and mid tibiae without dorsal spurs except at apex. Hind tibiae usually with three apical spurs on each side. Fore wings not reaching tip of abdomen and usually reduced to short lobes; stridulatory file of male with dense, evenly spaced teeth (about 100 per mm). Hind wings vestigial. Male ninth abdominal tergite more or less enlarged. Male tenth abdominal tergite highly modified into heavily sclerotized structure varying in shape in different species. Male subgenital plate with two long, upwardly curved processes; styles absent. Ovipositor well developed, relatively large, with fine teeth.

DISCUSSION. Males of *Peropyrrhicia* may be recognized by the highly modified tenth abdominal tergite*, which has a particularly bizarre shape in *P. massaiae, P. antinorii* and *P. maculata,* and the long processes on the subgenital plate. The females are characterized by the relatively large, finely toothed ovipositor.

DISTRIBUTION. Known only from Ethiopia, the Somali Republic and the neighbouring part of the Arabian Peninsula.

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*Uvarov (1934) considered the ventral part of this structure to be the supra-anal plate, but I am regarding it here as part of the tenth abdominal tergite.

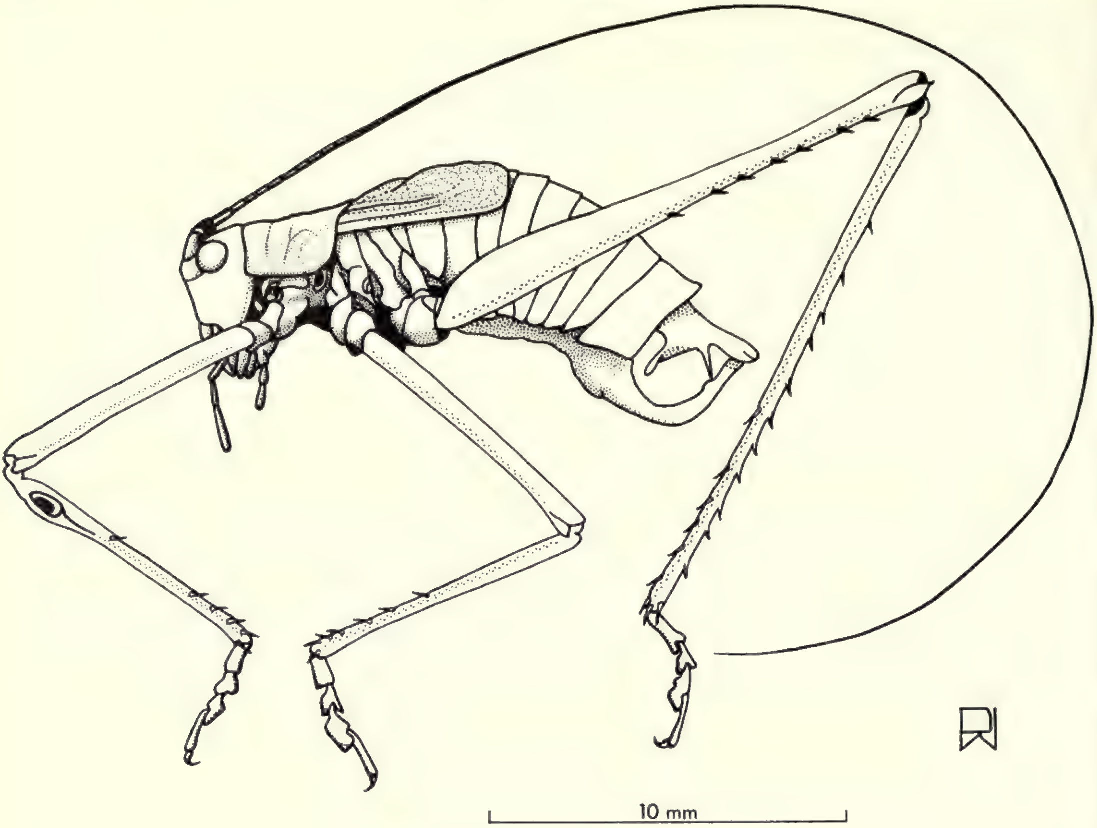


Fig. 52 *Peropyrrhicia massaiae*, male.

Key to the species of *Peropyrrhicia*

Males

1 Tenth abdominal tergite shaped as in Fig. 57. Fore wings not reaching beyond the first abdominal tergite. (Arabian Peninsula) . . . . **P. parva** sp. n. (p. 115)

– Tenth abdominal tergite not shaped as in Fig. 57. Fore wings reaching beyond the first abdominal tergite. (Ethiopia or Somali Republic) 2

2 Tenth abdominal tergite shaped as in Fig. 56. Fore wings not reaching beyond the second abdominal tergite. Fore and mid femora usually with ventral spinules . . **P. guichardi** sp. n. (p. 114)

– Tenth abdominal tergite not shaped as in Fig. 56. Fore wings reaching beyond the second abdominal tergite. Fore and mid femora unarmed 3

3 Tenth abdominal tergite shaped as in Figs 55 and 60, without spine-like processes **P. maculata** Schulthess (p. 113)

– Tenth abdominal tergite shaped as in Figs 53 and 58, or 54 and 59, with spine-like processes . 4

4 Tenth abdominal tergite shaped as in Figs 53 and 58, with relatively long lateral spines, directed downwards . . . . **P. massaiae** (Bormans) (p. 112)

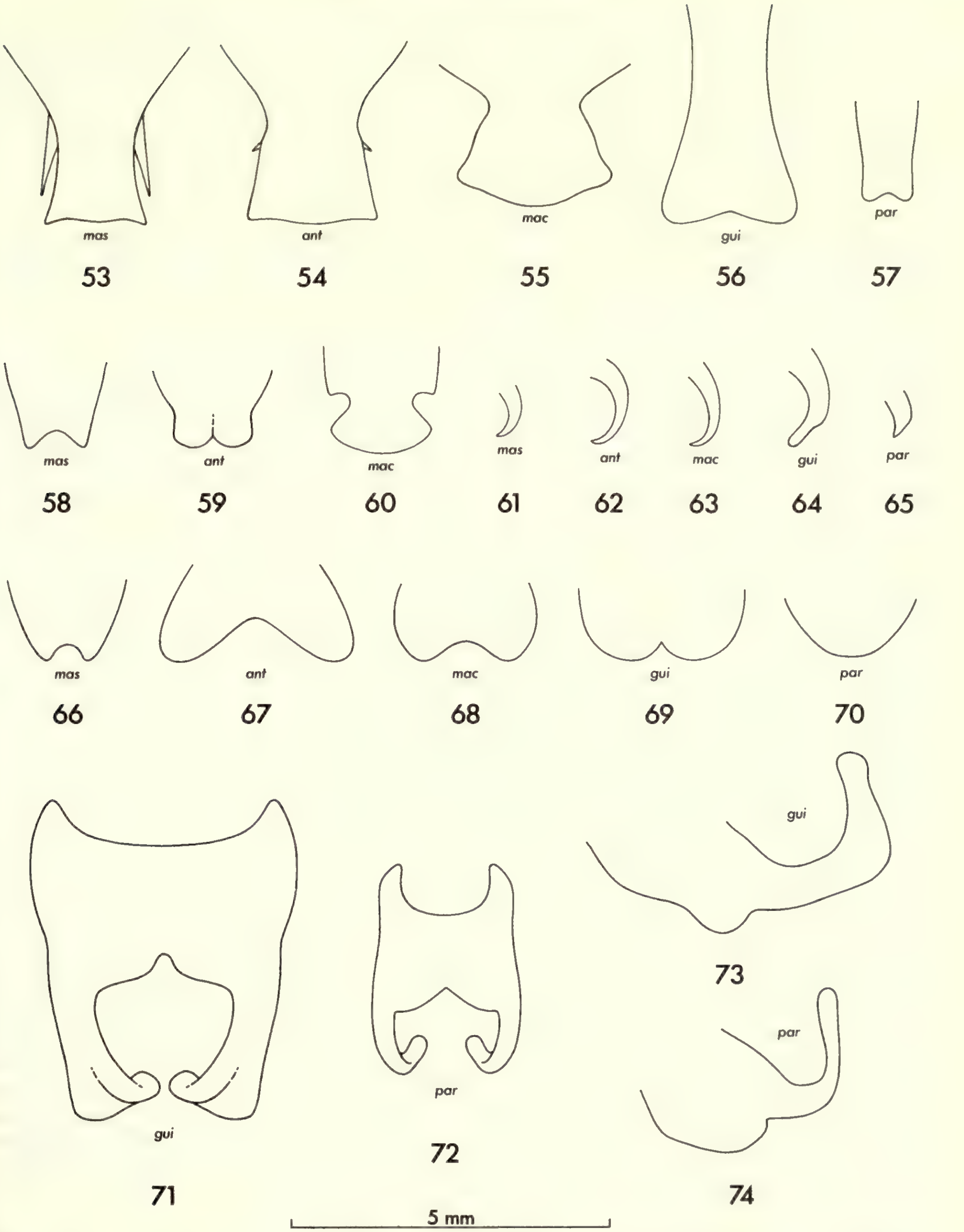
– Tenth abdominal tergite shaped as in Figs 54 and 59, with relatively short lateral spines, usually directed sideways . . . . **P. antinorii** (Bormans) (p. 113)

Females

1 Fore wings more than twice as long as the pronotum. . . . . **P. guichardi** sp. n. (p. 114)

– Fore wings less than twice as long as the pronotum 2

2 Subgenital plate shaped as in Fig 70, without a median emargination or indentation. (Arabian Peninsula) . . . . **P. parva** sp. n. (p. 115)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Figs 53–74 *Peropyrrhicia*. 53–57. Dorsal view of the male tenth abdominal tergite of (53) *P. massaiae*; (54) *P. antinorii*; (55) *P. maculata*; (56) *P. guichardi*; (57) *P. parva*. 58–60. Posterior view of the ventral part of the male tenth abdominal tergite of (58) *P. massaiae*; (59) *P. antinorii*; (60) *P. maculata*. 61–65. Dorsal view of the right male cercus of (61) *P. massaiae*; (62) *P. antinorii*; (63) *P. maculata*; (64) *P. guichardi*; (65) *P. parva*. 66–70. Ventral view of the female subgenital plate of (66) *P. massaiae*; (67) *P. antinorii*; (68) *P. maculata*; (69) *P. guichardi*; (70) *P. parva*. 71, 72. Ventral view of the male subgenital plate of (71) *P. guichardi* and (72) *P. parva*. 73, 74. Lateral view of the male subgenital plate of (73) *P. guichardi* and (74) *P. parva*.

– Subgenital plate not shaped as in Fig. 70, with a clear median emargination or indentation. (Ethiopia or Somali Republic) 3
3 Subgenital plate shaped as in Fig. 66, with broadly diverging lobes . ***P. massaiae*** (Bormans) (p. 112)
– Subgenital plate shaped as in Figs 67 or 68, its lobes not broadly diverging 4
4 Subgenital plate shaped as in Fig. 67 . . . . ***P. antinorii*** (Bormans) (p. 113)
– Subgenital plate shaped as in Fig. 68 . . . . ***P. maculata*** Schulthess (p. 113)

Peropyrrhicia massaiae (Bormans)

(Figs 52, 53, 58, 61, 66)

Dichopetala massaiae Bormans, 1881: 218. 2 ♂ syntypes (1 nymphal), ETHIOPIA: Let-Marefia (probably destroyed – see below).

Peropyrrhicia massaiae (Bormans) Brunner, 1891: 37.

?*Peropyrrhicia scotti* Uvarov, 1934: 597. Holotype ♂, ETHIOPIA: between Jem-Jem and Addis Ababa (BMNH) [examined]. (See below.)

DIAGNOSIS. ♂. Fore and mid femora unarmed. Fore wings reaching third abdominal tergite, their anterior margin almost straight. Tenth abdominal tergite shaped as in Figs 53 and and 58. Cerci shaped as in Fig. 61.

♀. Fore and mid femora unarmed. Fore wings scarcely longer than pronotum, not reaching beyond second abdominal tergite, tending to be bluntly pointed at tip, their anterior margin almost straight. Subgenital plate shaped as in Fig. 66.

MEASUREMENTS

	Males	Females
Total length	(10): 14·4–18·6, mean 16·44	(5): 15·7–20·7, mean 18·80
Median length of pronotum	(10): 2·9–3·5, mean 3·17	(6): 3·5–4·1, mean 3·73
Length of hind femur	(10: 12·5–16·9, mean 15·13	(6): 13·9–15·8, mean 15·15
Length of fore wing	(10): 4·4–5·3, mean 4·81	(6): 4·4–4·8, mean 4·52
Length of ovipositor		(6): 10·5–11·7, mean 11·08

DISCUSSION. The shape of the tenth abdominal tergite enables the males of this species to be easily recognized. The females have much shorter fore wings than *P. guichardi*, but rather longer fore wings than *P. parva*; these organs also tend to be pointed at the tip in *P. massaiae*, but are smoothly rounded in *P. guichardi* and *P. parva*. The shape of the subgenital plate enables the females to be distinguished from *P. antinorii* and *P. maculata*.

Dr D. Guiglia of the MCSN, Genoa, tells me that the type-material of *massaiae* was in alcohol and was almost certainly destroyed during the Second World War. It is by no means certain from the original description which species this name should be applied to, and Borman's illustration of the tip of the abdomen was clearly given the wrong caption – it is probably taken from a female Acridid rather than a male Tettigoniid. The other names based on male types that can be considered as possible synonyms of *massaiae* are *maculata*, *scotti* and *cooperi*. The first of these was described from much further south in Ethiopia and does not fit the description of *massaiae* very closely. The other two were described from the same area of central Ethiopia as *massaiae*, but the spine-like lateral processes from the tenth abdominal tergite that occur in both of them are not mentioned in the description of *massaiae*. However, Bormans (1881: 218) makes an unmistakable reference ('*apicem versus dente parvo interno, obtuso instructos*') to the small internal tubercles that occur on the posterior processes of the subgenital plate in *scotti*, but not in *cooperi*. Although it is impossible to draw any certain conclusions from these observations, it seem to me quite likely that *massaiae* and *scotti* are synonymous.

MATERIAL EXAMINED

Peropyrrhicia scotti Uvarov, holotype ♂, **Ethiopia**: between Jem-Jem and Addis Ababa, 2100–2400 m, 11–14.x.1926 (*Scott*) (BMNH).

Ethiopia: 1 ♂, Welega province, Komto-Kombo, near Nkemte, 2090 m, *Ageratum*/*Solanum*/arum herb growth, 10.x.1975 (*Jago & Stretch-Liljer*); 1 ♂, 2 ♀, Welega province, 6 km W. of Gimbi, 1940 m, overgrown coffee farm, 16.ix.1976 (*Jago*); 1 ♂, Welega province, 35 km W. of Mendi, Dabus R. flood plain, 1390 m, elevations with trees and grass, 18.ix.1976 (*Jago*); 3 ♂, 1 ♀, Welega province, 21 km E. of Mendi, Mendi-Nejo road, 1650 m, rank weeds in coffee farm, 19.ix.1976 (*Jago*); 1 ♂, Shewa province, 23·5 km W.

of Addis Ababa, 2525 m, *Eucalyptus* woods and grazed marsh near stream, 7.xi.1975 (*Jago & Stretch-Liljer*); 2 ♂, 2 ♀, Shewa province, Addis Ababa – Nkemte road, below scarp W. of Gedo, 2180 m, riverine forest and meadow, 9.x.1975 (*Jago & Stretch-Liljer*); 1 ♀, Abbai Gorge, gravel pit, 5.xii.1975 (*Stretch-Liljer*).

All in the BMNH.

DISTRIBUTION. Known only from central Ethiopia.

Peropyrrhicia antinorii (Bormans) **comb. n.**

(Figs 54, 59, 62, 67)

Leptophyes antinorii Bormans, 1881: 217. Holotype ♀, ETHIOPIA: Shewa (probably destroyed – see below).
Peropyrrhicia cooperi Uvarov, 1934: 598. Holotype ♂, ETHIOPIA: Jem-Jem Forest (BMNH) [examined]. **Syn. n.**

DIAGNOSIS. ♂. Fore and mid femora unarmed. Fore wings reaching third abdominal tergite, their anterior margin almost straight. Tenth abdominal tergite shaped as in Figs 54 and 59. Cerci shaped as in Fig. 62.

♀. Fore and mid femora unarmed. Fore wings scarcely longer than pronotum, not reaching beyond second abdominal tergite, tending to be bluntly pointed at tip, their anterior margin almost straight. Subgenital plate shaped as in Fig. 67.

MEASUREMENTS

	Males	Females
Total length	(5): 16·0–18·4, mean 16·98	(2): 21·6–21·9, mean 21·75
Median length of pronotum	(6): 2·8–3·5, mean 3·17	(3): 3·7–4·3, mean 3·97
Length of hind femur	(6): 12·9–15·9, mean 14·63	(3): 14·4–17·0, mean 15·87
Length of fore wing	(6): 4·4–5·5, mean 5·02	(3): 3·9–4·8, mean 4·30
Length of ovipositor		(3): 10·8–11·0, mean 10·93

DISCUSSION. The males of this species may be easily recognized by the characteristically shaped tenth abdominal tergite. The females are very similar to those of *P. massaiae*, but differ in the shape of the subgenital plate.

I understand from Dr D Guiglia of the MCSN, Genoa, that the female holotype of *antinorii* was in alcohol and was almost certainly destroyed during the Second World War. However, the original description makes it clear that the subgenital plate of this specimen had the broadly divergent lobes ('*margine postico late profundeque triangulariter exciso*') that are characteristic of the females that I feel confident in associating with the males of the type-series of *cooperi*; I am therefore regarding these two names as synonymous. It follows from this that the genus *Leptophyes* Fieber is no longer represented in Africa.

MATERIAL EXAMINED

Peropyrrhicia cooperi Uvarov, holotype ♂, **Ethiopia**: Jem-Jem Forest, 2400–2700 m, 22–24.ix.1926 (*Scott*) (BMNH).

Ethiopia: 1 ♂, Jem-Jem, c. 2400 m, 9.x.1926 (*Scott*) (paratype of *Peropyrrhicia cooperi* Uvarov); 1 ♂, Mount Zuquala, c. 2700 m, 24–25.x.1926 (*Omer Cooper*) (paratype of *Peropyrrhicia cooperi* Uvarov); 1 ♀, Jem-Jem Forest, nearly 2700 m, 1.x.1926 (*Scott*); 1 ♀, Mount Chillalo, 2700 m, 12–17.xi.1926 (*Scott*); 1 ♂, Kambata province, Shone district, Bulgita, c. 1900 m, 20.x.1948 (*Scott*); 1 ♂, Gamo province, near Ezo, c. 2900 m, 20–21.xi.1948 (*Scott*); 1 ♀, Wolamo province, S. face of Mt Damota, c. 2900 m, 6.xi.1948 (*Scott*); Gore, 35°31′E, 8°8′N, 2007 m, 8–23.xii.1959 (*Richter*).

All in the BMNH.

DISTRIBUTION. The known distribution of *P. antinorii* is confined to Ethiopia, extending from Shewa province down to the region of Lake Abaya in the extreme north of Sidamo province.

Peropyrrhicia maculata Schulthess

(Figs 55, 60, 63, 68)

Peropyrrhizia maculata Schulthess, 1898: 198. 1 ♂, 1 ♀, syntypes, ETHIOPIA: Giam-Giam (♂), Biddwara (♀) (MCSN, Genoa) [examined].

DIAGNOSIS. ♂. Fore and mid femora unarmed. Fore wings reaching third abdominal tergite, their anterior margin almost straight. Tenth abdominal tergite shaped as in Figs 55 and 60. Cerci shaped as in Fig. 63.

♀. Fore and mid femora unarmed. Fore wings not longer than pronotum, not reaching beyond second abdominal tergite. Subgenital plate shaped as in Fig. 68.

MEASUREMENTS

	Male syntype	Female syntype
Total length	14·6	17·0
Median length of pronotum	3·2	3·9
Length of hind femur	14·7	15·4
Length of fore wing	4·0	3·4
Length of ovipositor		10·7

DISCUSSION. This species, known only from the two syntypes, forms with *P. massaiae* and *P. antinorii* a trio of closely similar species. The male of *P. maculata* may, however, be recognized by the shape of the tenth abdominal tergite. The female syntype was collected from a different locality and may not be conspecific with the male; it differs from *P. massaiae* and *P. antinorii* in the shape of the subgenital plate and also in having coarser teeth on the ovipositor.

MATERIAL EXAMINED

1 ♂ syntype, **Ethiopia**: Giam-Giam, ix.1893 (*Ruspoli*) (MCSN, Genoa); 1 ♀ syntype, **Ethiopia**: Biddwara, ix. 1893 (*Ruspoli*) (MCSN, Genoa).

DISTRIBUTION. Known only from the two syntype localities in Sidamo province, Ethiopia.

***Peropyrrhicia guichardi* sp. n.**

(Figs 56, 64, 69, 71, 73)

DIAGNOSIS. ♂. Fore and mid femora usually with ventral spinules. Fore wings not reaching beyond second abdominal tergite, smoothly rounded at tip, their anterior margin convex. Tenth abdominal tergite shaped as in Fig. 56. Cerci shaped as in Fig. 64.

♀. Fore and mid femora usually with ventral spinules. Fore wings more than twice as long as pronotum, smoothly rounded at tip. Subgenital plate shaped as in Fig. 69.

DESCRIPTION. ♂. Eyes slightly oval.

Fore and mid femora usually with variable number of ventral spinules. Hind femora with about 6–14 ventral spinules. Fore tibiae with about 5–6 external ventral spurs. Mid tibiae with about 5–8 external ventral spurs. Hind tibiae with about 15–20 external dorsal spines. Fore wings not reaching beyond second abdominal tergite, smoothly rounded at tip, their anterior margin convex; radial area with translucent patch.

Tenth abdominal tergite shaped as in Fig. 56. Supra-anal plate with deep median emargination. Cerci shaped as in Fig. 64. Subgenital plate shaped as in Figs 71 and 73.

General coloration green with reddish brown and black markings. Head and pronotum reddish brown above; antennae with dark band at distal end of each segment. Legs mostly green with dark markings at knees, towards tip of tibiae and on tarsi. Femoral and tibial spines conspicuously black. Fore wings white along costal margin, dark brown or black in stridulatory region, green towards tip. Abdomen with red-brown spots and conspicuous dorsal black mark on hind margin of tergites 3–9. Processes of subgenital plate with dark markings near tip.

♀. As male except for fore wings, genitalia and coloration. Fore wings smoothly rounded at tip. Subgenital plate shaped as in Fig. 69. Coloration almost entirely green with few red-brown markings and red-brown spots on abdominal tergites. Fore wings almost entirely green except for white costal margin. Ovipositor mostly green, becoming red-brown at tip. Antennae and spines of femora and tibiae coloured as in male.

MEASUREMENTS

	Males	Females
Total length	(2): 21·2–23·2, mean 22·20	(2): 21·4–21·8, mean 21·60
Median length of pronotum	(2): 4·0–4·6, mean 4·30	(4): 4·6–5·4, mean 4·98
Length of hind femur	(2): 15·8–16·6, mean 16·20	(4): 16·1–18·5, mean 16·95
Length of fore wing	(2): 4·6–4·8, mean 4·70	(4): 11·0–13·5, mean 12·08
Length of ovipositor		(4): 10·5–11·5, mean 10·88

Discussion. The males of *P. guichardi* may be easily recognized by the genitalia, especially the tenth abdominal tergite, and the females by the relatively long fore wings. This species is most unusual among brachypterous Orthoptera in that the females have longer fore wings than the males, but there seems to be no doubt that the two sexes are correctly associated.

Material examined

Holotype ♂, **Somali Republic**: Gan Libah, 1550 m, 2.vi.1949 (*Guichard*) (BMNH).

Paratypes. **Somali Republic**: 1 ♂, 2 ♀, same data and depository as holotype; 1 ♀ without further data (BMNH); 1 ♀, 'Somali ?' (*Paulitschke*) (NM, Vienna).

Distribution. Known only from the Somali Republic.

Peropyrrhicia parva sp. n.

(Figs 57, 65, 70, 72, 74)

Diagnosis. ♂. Fore and mid femora with ventral spinules; fore femora somewhat swollen. Fore wings not reaching beyond first abdominal tergite, smoothly rounded at tip, their anterior margin convex. Tenth abdominal tergite shaped as in Fig. 57. Cerci shaped as in Fig. 65.

♀. Fore and mid femora with ventral spinules. Fore wings not or hardly reaching beyond first abdominal tergite, smoothly rounded at tip. Subgenital plate shaped as in Fig. 70.

Description. ♂. Eyes circular or almost so.

Fore femora somewhat swollen, with about 4 ventral spinules in addition to apical ones. Mid femora with about 2–4 ventral spinules in addition to apical ones. Hind femora with about 10–12 ventral spinules. Fore tibiae with 5 external ventral spurs. Mid tibiae with 6–7 external ventral spurs. Hind tibiae with about 16–21 external dorsal spines. Fore wings not reaching beyond first abdominal tergite, smoothly rounded at tip, their anterior margin convex; radial area with translucent patch.

Tenth abdominal tergite shaped as in Fig. 57. Cerci shaped as in Fig. 65. Subgenital plate shaped as in Figs 72 and 74.

General coloration probably green in life, but brown in holotype. *Sc* and *R* of fore wings darkened towards base. Spines on legs darkened at tip.

♀. As male except for fore wings, genitalia and coloration. Fore wings reaching almost to hind margin of first abdominal tergite, or slightly beyond it, smoothly rounded at tip. Subgenital plate shaped as in Fig. 70. Fore wings unicolorous.

Measurements	Male	Females
Total length	12·8	(3): 14·3–18·3, mean 16·00
Median length of pronotum	3·4	(3): 4·0–4·4, mean 4·23
Length of hind femur	15·0	(3): 15·8–17·3, mean 16·47
Length of fore wing	2·4	(3): 3·0–3·4, mean 3·13
Length of ovipositor		(3): 9·0–9·4, mean 9·13

Discussion. The characteristic genitalia enable males of this species to be easily recognized. The females are characterized by their short, smoothly rounded fore wings.

Material examined

Holotype ♂, **Southern Yemen**: Jebel Jihaf, c. 2350 m, 4.x.1937 (*Scott & Britton*) (BMNH).

Paratypes. **Southern Yemen**: 2 ♀, Jebel Jihaf, c. 2150 m, ix.1937 (*Scott & Britton*); 1 ♀, Jebel Harir, 1600 m, 26.x–6.xi.1937 (*Scott & Britton*).

Material excluded from the type-series. **Southern Yemen**: 1 ♀ nymph, Jebel Jihaf, c. 2150 m, x.1937 (*Scott & Britton*). **Yemen**: 1 ♂ nymph, Wadi Thabad, N. face of Jebel Sabir, c. 1750 m, 25–26.xii.1937 (*Scott & Britton*).

All in the BMNH.

Distribution. Known only from mountains in the south-west of the Arabian Peninsula.

CORYMETA Brunner

(Fig. 75)

Corymeta **Brunner, 1878: 126. Type-species:** ***Phaneroptera amplectens*** **Schaum, by monotypy.**

♂♀. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above. Eyes slightly oval, prominent. Pronotum with more or less distinct median carina but without lateral carinae, surface

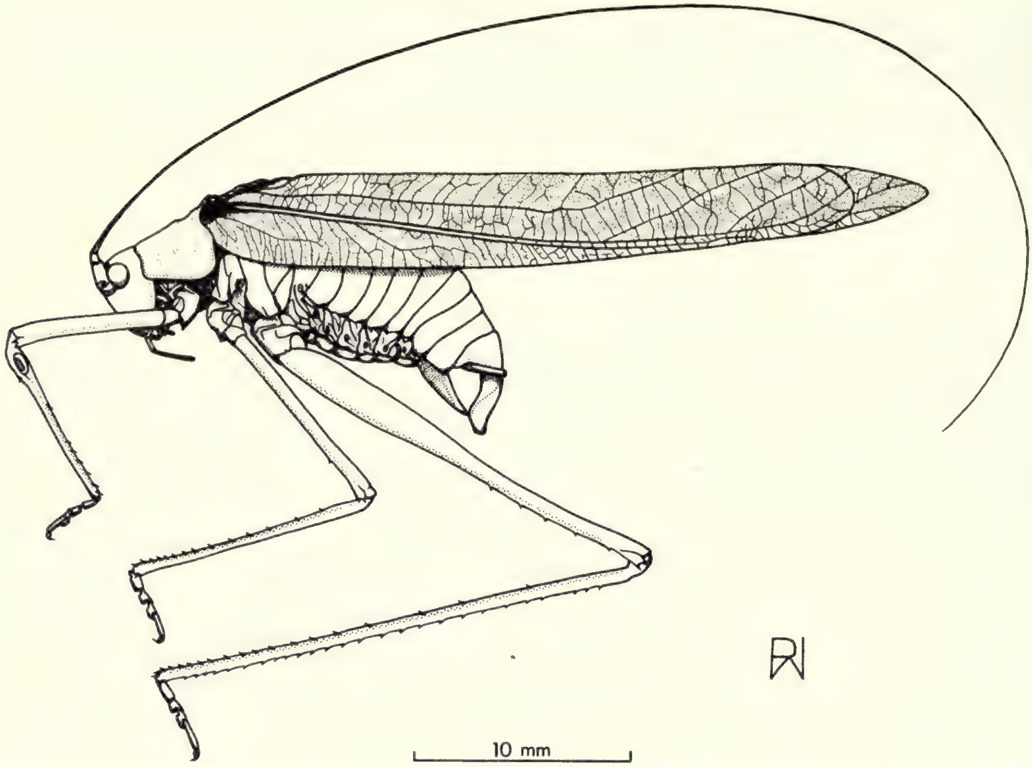


Fig. 75 *Corymeta amplectens*, male.

smooth and matt. Fore coxae without spine. Femora with ventral spinules (sometimes only one on fore or mid femora). Fore tibiae with open tympanum on each side. Fore and mid tibiae with dorsal spurs. Hind tibiae with two or three apical spurs on each side. Both pairs of wings fully developed. Fore wings matt, scarcely translucent; *Sc* and *R* separate from base; *R* with pectinately arranged posterior branches. Male tenth abdominal tergite highly modified with long, downwardly curved posterior process. Male subgenital plate without styles. Ovipositor well developed, with very fine crenulation.

DISCUSSION. The males of the only known species of this genus may be easily recognized by the characteristically shaped process from the tenth abdominal tergite.

The female sex has hitherto been unknown, but I have examined a female specimen (kindly lent to me by Dr K. K. Günther of the MNHU, Berlin) which clearly belongs to this genus. It bears the data 'D.-Ostafrika, Makond. Hochld., 8–11.xii.10, H. Grote S.G.' and was presumably collected from the Makondi Plateau in the extreme south of Tanzania. It is impossible to be certain that this specimen is conspecific with the holotype of *C. amplectens* (described from Mozambique) or with a male in the BMNH from Bindura, Rhodesia, but there is no doubt that it is congeneric. The tenth abdominal tergite is produced somewhat posteriorly into a rudimentary homologue of the long process shown by the male. The ovipositor is large and becomes slightly deeper in the distal half before tapering to a point. The cerci are unusually long and slender, and the subgenital plate is extended on each side into a pointed process. The measurements are as follows: total length 48·4 mm, median length of pronotum 5·3 mm, length of hind femur 23·9 mm, length of fore wing 37·4 mm, length of ovipositor 13·0 mm.

DISTRIBUTION. So far known only from Mozambique, Rhodesia and the extreme south of Tanzania.

INCLUDED SPECIES. *C. amplectens* (Schaum).

MILITITSA Burr

(Fig. 16)

Milititsa Burr, *in* Peel *et al.*, 1900: 42. Type-species: *Milititsa somaliensis* Burr, by monotypy.

♂ unknown.

♀. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above. Eyes circular or almost so, very prominent. Pronotum without lateral carinae, surface smooth and matt. Fore coxae without spine. Femora with few ventral spinules. Fore tibiae with open tympanum on each side. Fore and mid tibiae with dorsal spurs. Hind tibiae with three apical spurs on each side. Both pairs of wings fully developed. Fore wings matt and mostly opaque, but with translucent band along anterior margin; *Sc* and *R* separated at base but becoming almost contiguous for part of their length before diverging distally; *R* with pectinately arranged posterior branches (Fig. 16). Cerci unusually slender. Ovipositor well developed, relatively large, with very fine crenulation.

DISCUSSION. Although Burr (*in* Peel *et al.*, 1900) considered this genus to belong to Brunner's group 'Terpnistriae', it lacks the frontogenal carinae on the head and the modified leg spines shown by that group and seems really to be of doubtful affinity. It is quite likely that the discovery of the male sex would throw further light on its relationships with other African Phaneropterinae.

DISTRIBUTION. Known only from the type-locality of the type-species, 'North-west Somaliland, Whardi Datal'. I have previously thought this locality to be in what is now the Somali Republic (Ragge, 1968), but a careful reading of the 'Narrative of the Expeditions' (Peel *et al.*, 1900: 4) has convinced me that it is almost certainly in the Harar district of Ethiopia, not far from Jijiga.

INCLUDED SPECIES. *M. somaliensis* Burr.

TROPIDONOTACRIS Chopard

Tropidonotacris Chopard, *in* Chopard & Kevan, 1954: 321. Type-species: *Tropidonotacris carinata* Chopard, by original designation.

♂♀. Vertex with median carina; fastigium compressed, narrower than first antennal segment, projecting forwards beyond fastigium of frons, not sulcate above. Eyes slightly or distinctly oval, fairly prominent. Pronotum with very prominent median carina but without lateral carinae, surface smooth and matt. Fore coxae with very small spine or unarmed. Femora with ventral spinules. Fore tibiae with open tympanum on each side. Fore and mid tibiae with dorsal spurs. Hind tibiae with three apical spurs on each side. Both pairs of wings fully developed in male, rather reduced in female (known only in *T. amabilis*) with hind wings not extending beyond fore wings. Fore wings somewhat shiny and translucent in male, less so in female; *Sc* and *R* separate from base, but closely approximated along much of their length; *R* with pectinately arranged posterior branches. Male tenth abdominal tergite unmodified or slightly enlarged. Male subgenital plate without styles. Ovipositor well developed, with fine crenulation.

DISCUSSION. Both sexes of this genus may be recognized at once by the uniquely prominent median carina on the vertex and pronotum.

Since my revision of this genus (Ragge, 1975*a*) I have seen further material of *T. carinata* from Lake Turkana, Kenya, and Afgoi (near Mogadiscio), Somali Republic, and of *T. amabilis* from Isiolo, Kenya, and Dagahbur, Ethiopia. *T. grandis* is still known only from the holotype.

DISTRIBUTION. Known only from Ethiopia, the Somali Republic, Kenya and Tanzania.

INCLUDED SPECIES. *T. amabilis* Ragge, *T. carinata* Chopard, *T. grandis* Ragge.

PARDALOTA Brunner

Pardalota Brunner, 1878: 133. Type-species: *Pardalota versicolor* Brunner, by monotypy.

♂♀. Fastigium of vertex poorly developed, sloping steeply to frons, about the same width as or somewhat narrower than first antennal segment, sulcate. Eyes slightly oval, sometimes almost circular, prominent. Pronotum without lateral carinae, hind margin often roundly bilobed with shallow median indentation, surface smooth and matt. Fore coxae without spine. Femora unarmed. Fore tibiae with open tympanum on

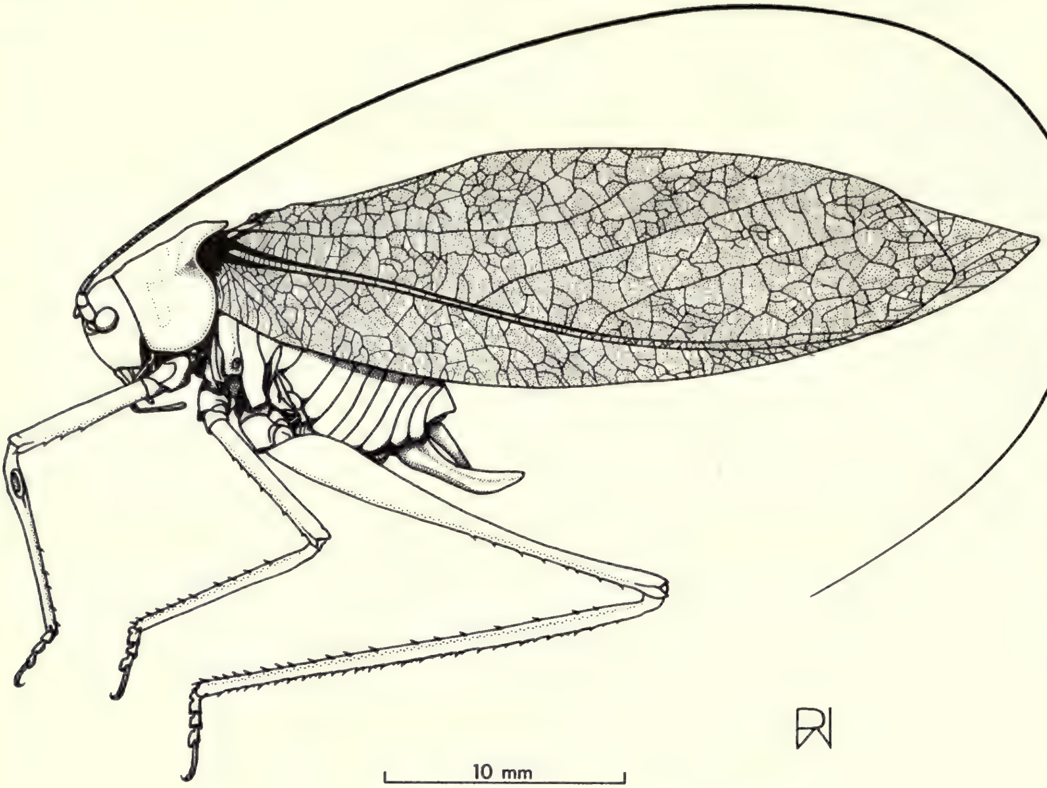


Fig. 76 *Tropidonotacris carinata*, male.

each side. Fore and mid tibiae without dorsal spurs. Hind tibiae with two apical spurs on each side. Both pairs of wings well developed, but hind wings not extending beyond fore wings (except sometimes in dried specimens, as a result of shrinkage). Fore wings relatively broad, matt and opaque except sometimes for translucent patches; *Sc* and *R* slightly separate at base but often becoming contiguous or almost so for part of their length before diverging distally. Male tenth abdominal tergite enlarged, sometimes greatly so, produced laterally into points or asymmetrical processes. Male subgenital plate without styles. Ovipositor well developed, relatively long, with very fine crenulation, sometimes almost smooth-edged.

DISCUSSION. This genus is characterized by the very poorly developed fastigium of the vertex, combined with the strikingly variegated colour pattern. The colour pattern is similar to that of the related genus *Poecilogramma*, which, however, has a better developed and narrower fastigium. The nature of the fastigium of the vertex provides the only significant means of separating these two genera and it is on this basis that I have transferred *cloetensi* from *Pardalota* to *Poecilogramma*.

DISTRIBUTION. *Pardalota* occurs widely in central Africa, its range extending from Congo and Angola in the west across Zaire and Zambia to Uganda and Tanzania in the east.

INCLUDED SPECIES. *P. asymmetrica* Karsch, *P. haasi* Griffini, *P. karschiana* Enderlein, *P. reimeri* La Baume, *P. superba* Sjöstedt, *P. versicolor* Brunner.

POECILOGRAMMA Karsch

(Fig. 77)

Poecilogramma Karsch, 1887: 52. Type-species: *Poecilogramma striatifemur* Karsch, by subsequent designation (Kirby, 1906: 405).

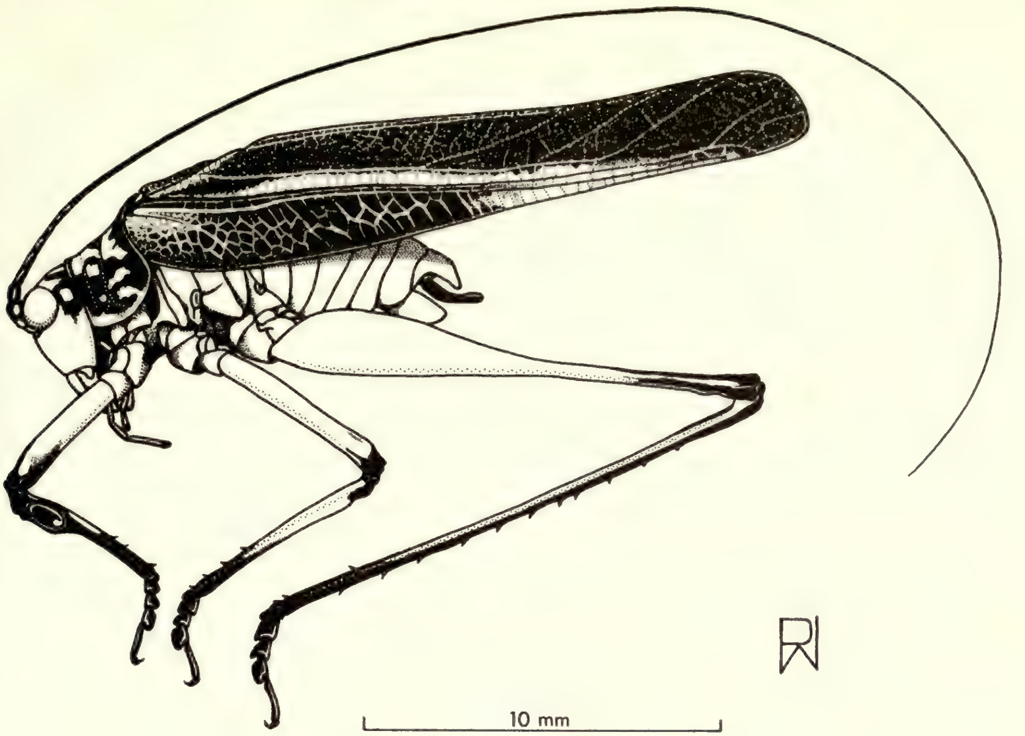


Fig. 77 *Poecilogramma striatifemur*, male.

♂♀. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above. Eyes circular or almost so, prominent. Pronotum without lateral carinae, surface smooth and matt or slightly shiny. Fore coxae without spine. Femora unarmed. Fore tibiae with open tympanum on each side. Fore and mid tibiae without dorsal spurs. Hind tibiae with two or three apical spurs on each side. Both pairs of wings fully developed, but hind wings not extending beyond fore wings (except sometimes in dried specimens, as a result of shrinkage). Fore wings matt and opaque; *Sc* and *R* slightly separate or contiguous at base and contiguous or almost so for much of their length before diverging distally. Male tenth abdominal tergite unmodified or much enlarged. Male subgenital plate without styles. Ovipositor well developed, with fine crenulation or coarse teeth.

DISCUSSION. *Poecilogramma* may be recognized by the strikingly variegated colour pattern combined with the clearly developed, narrow fastigium of the vertex. I have chosen to take the nature of the fastigium of the vertex as the main character separating this genus from *Pardalota*, which is very similar in other respects, including colour pattern; as a result of this *cloetensi*, which has a clearly developed, narrow fastigium of the type shown by *striatifemur* and *annulifemur*, has to be transferred from *Pardalota* to *Poecilogramma*.

DISTRIBUTION. Very similar to *Pardalota*. *P. cloetensi* occurs in central Africa from Cameroun to Zaire, and the other two species are primarily East African, extending from Kenya through Tanzania to Zambia and the extreme south of Zaire.

INCLUDED SPECIES. *P. annulifemur* Karsch, *P. cloetensi* (Griffini) **comb. n.** (see above), *P. striatifemur* Karsch.

KEVANIELLA Chopard

(Figs 17, 78)

Kevaniella Chopard, *in* Chopard & Kevan, 1954: 332. Type-species: *Kevaniella bipunctata* Chopard, by original designation.

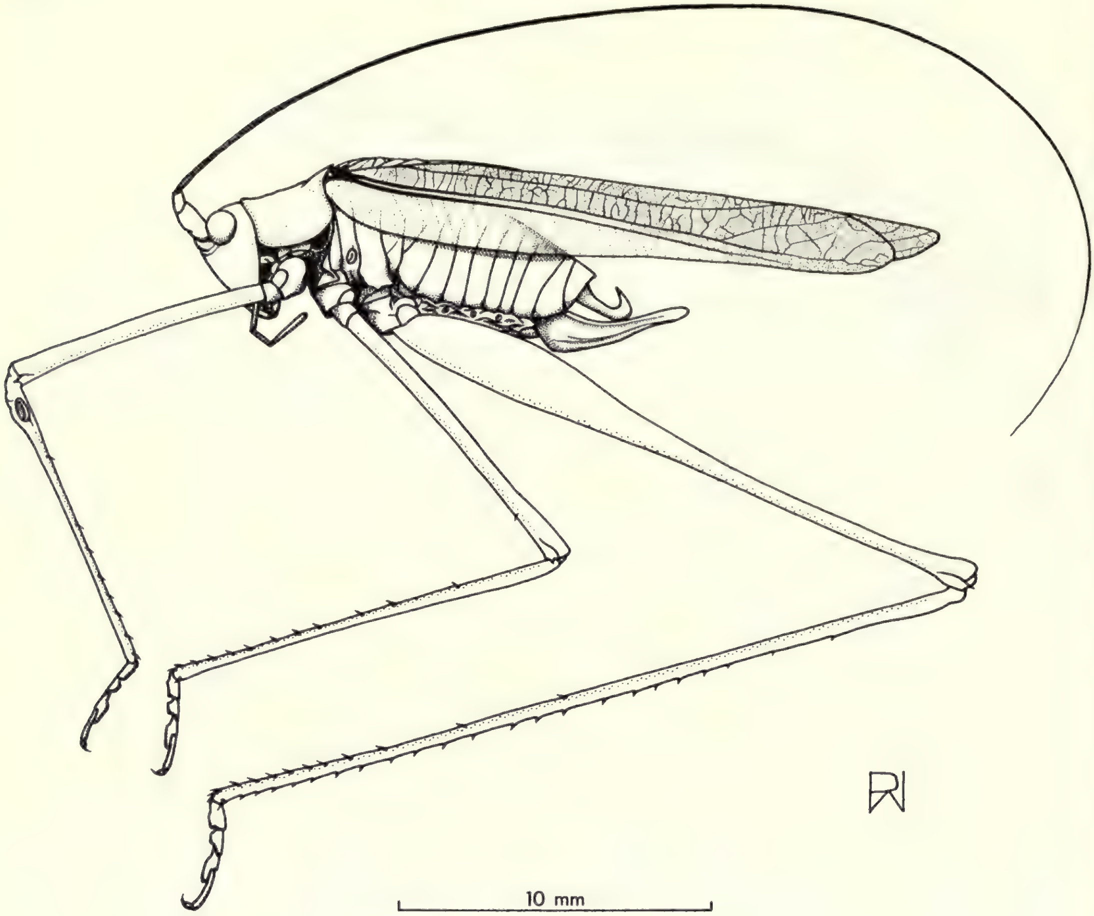


Fig. 78 *Kevaniella bipunctata*, male.

♂ ♀. Fastigium of vertex sloping steeply to frons, compressed, narrower than first antennal segment, sulcate above. Eyes slightly oval, prominent. Pronotum without lateral carinae, surface smooth and slightly shiny. Fore coxae without spine. Fore and mid femora unarmed or with very few ventral spinules. Hind femora unarmed. Fore tibiae with open tympanum on each side. Fore and mid tibiae with or without dorsal spurs. Hind tibiae with three apical spurs on each side. Both pairs of wings fully developed in male, rather less so in female, not reaching hind knees in either sex. Fore wings shiny (much less so in costal area), sometimes somewhat translucent; *Sc* and *R* separate from base. Male tenth abdominal tergite unmodified. Male subgenital plate without styles. Ovipositor well developed, relatively long and narrow, with fine crenulation (Fig. 17).

Discussion. *Kevaniella* does not appear to have any close relatives in the Phaneropterinae. In general appearance it is rather like *Phaneroptera acaciae* or a narrow-winged *Eulioptera*, but it has a quite different pronotum and much longer ovipositor. The ovipositor is reminiscent of *Pardalota* and *Poecilogramma*, but the pronotum is again quite different, the hind wings extend beyond the fore wings, and the legs are relatively longer and more slender, especially in the male.

Distribution. Described from north-east Kenya, but there are specimens in the BMNH from Ethiopia and the Somali Republic.

Included species. *K. bipunctata* Chopard.

CATOPTROPTERYX Karsch

(Fig. 79)

Catoptropteryx Karsch, 1890: 361. Type-species: *Catoptropteryx guttatipes* Karsch, by monotypy.

♂♀. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above. Eyes almost circular or distinctly oval, usually prominent. Pronotum without lateral carinae, surface smooth and shiny. Fore coxae with spine. Fore and mid femora usually with ventral spinules. Hind femora with ventral spinules. Fore tibiae with open tympanum on each side, or with external tympanum open and internal tympanum more or less auriculate. Fore and mid tibiae with or without dorsal spurs in addition to apical one. Hind tibiae with three apical spurs on each side. Both pairs of wings fully developed. Fore wings shiny and translucent; *Sc* and *R* contiguous in proximal half. Male tenth abdominal tergite unmodified. Male subgenital plate with styles. Ovipositor much reduced, smooth-edged or with few small teeth at apex of dorsal valves.

Discussion. *Catoptropteryx* may be separated from most other African Phaneropterinae by the combination of smooth, shiny pronotum and translucent, shiny fore wings; the shape of the much reduced ovipositor is also characteristic. *Dapanera* Karsch is quite similar but the fore wings are less translucent, the inner tympanum of the fore tibiae is always auriculate and the ovipositor is fully developed.

This genus was revised by Huxley (1970), and he has since (Huxley, 1973) described the previously unknown female of *C. extensipes* and confirmed the correctness of the assignment of this species to *Catoptropteryx*.

Distribution. Mainly West African, from Guinea to Zaire and Uganda, but *C. aurita* is East African, from southern Kenya to Rhodesia and Mozambique.

Included species. *C. afra* (Karsch), *C. ambigua* Huxley, *C. apicalis* (Bolívar), *C. aurita* Huxley, *C. capreola* Karsch, *C. extensipes* Karsch, *C. guttatipes* Karsch, *C. naevia* Huxley, *C. nanus*

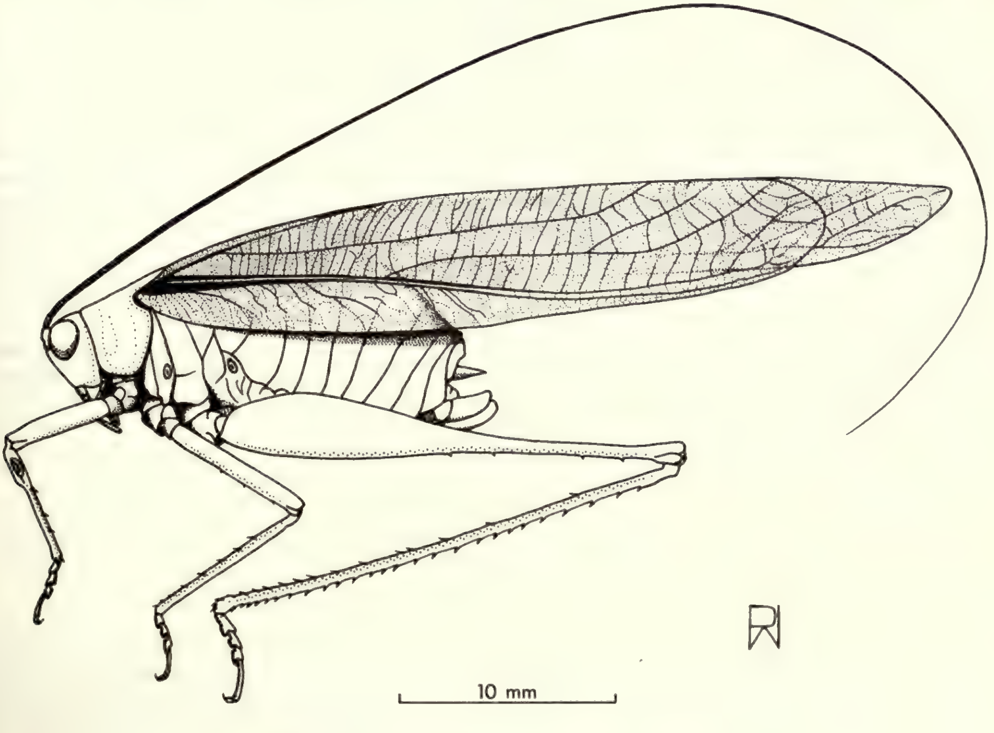


Fig. 79 *Catoptropteryx guttatipes*, female.

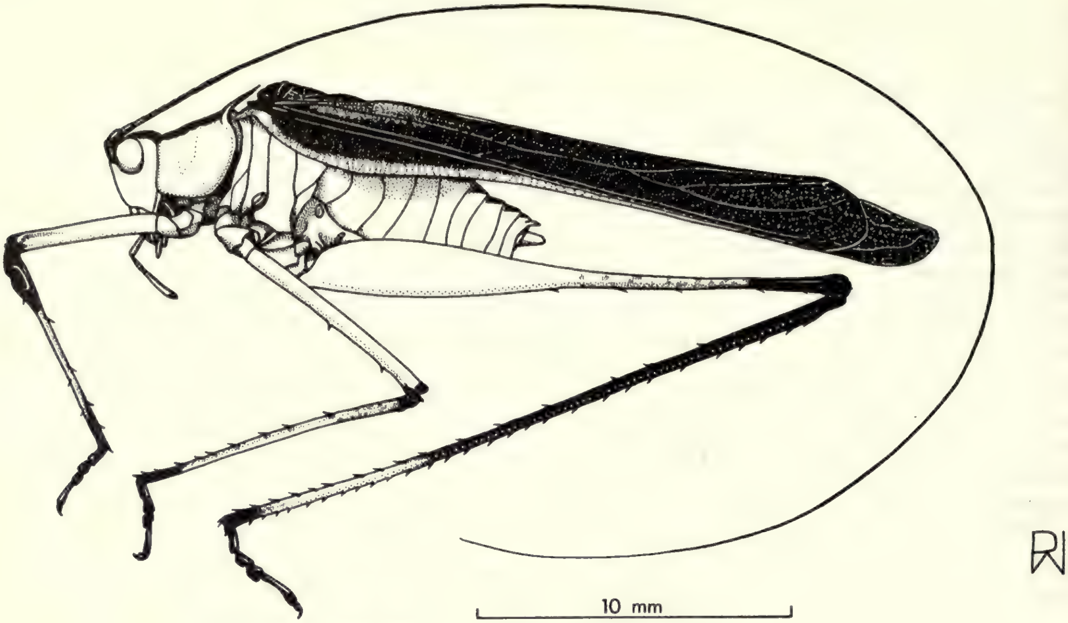


Fig. 80 *Dioncomena ornata*, male.

Huxley, *C. neutralipennis* Karsch, *C. nigrospinosa* (Brunner), *C. occidentalis* Huxley, *C. punctulata* (Karsch), *C. ramulosa* Huxley, *C. serrifera* Huxley.

PHANEROPTILA Uvarov

Phaneroptila Uvarov, *in* Uvarov & Popov, 1957: 363. Type-species: *Phaneroptila insularis* Uvarov, by monotypy.

♂. Fastigium of vertex somewhat compressed, narrower than first antennal segment, sulcate above, not reaching as far forwards as fastigium of frons. Eyes rather small, almost circular, prominent. Pronotum without lateral carinae, surface smooth and matt; lateral lobes with prominent anteroventral angle. Fore coxae with spine. Fore and mid femora unarmed. Hind femora with ventral spinules. Fore tibiae with open tympanum on each side. Fore and mid tibiae with dorsal spurs. Hind tibiae with three apical spurs on each side. Both pairs of wings rather reduced, falling well short of hind knees, hind wings not extending beyond fore wings. Fore wings matt and opaque; *Sc* and *R* very slightly separate at base but contiguous for most of their length. Tenth abdominal tergite unmodified. Subgenital plate without styles.
♀ unknown.

Discussion. The reduced wings, shape of the lateral pronotal lobes and well developed ventral spinules on the hind femora enable this genus to be distinguished from *Phaneroptera*, which it resembles in most other respects.

Distribution. Known only from the island of Socotra.

Included species. *P. insularis* Uvarov.

DIONCOMENA Brunner

Dioncomena Brunner, 1878: 208. Type-species: *Dioncomena ornata* Brunner, by monotypy.

♂ ♀. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above. Eyes oval, sometimes almost circular, prominent. Pronotum without lateral carinae, surface smooth and matt or somewhat shiny. Fore coxae with spine or unarmed. Fore and mid femora usually with ventral spinules. Hind femora with ventral spinules. Fore tibiae with open tympanum on each side. Fore and mid tibiae with dorsal spurs. Spurs of male mid tibiae often showing tendency to be hooked at tip, at least towards apex of tibiae, and sometimes further modified. Hind tibiae with three apical spurs on each side. Both pairs of wings fully developed. Fore wings either matt and opaque or shiny and translucent; *Sc* and *R* separate from base, though sometimes quite closely approximated along part of their length; *Rs* usually fused for part of its length with *MA*. Male tenth abdominal tergite usually unmodified or almost so (but bearing median dorsal protuberance in *D. bulla*). Male subgenital plate without styles, though sometimes with style-like processes. Ovipositor well developed, with fine teeth.

DISCUSSION. *Dioncomena* is most easily recognized by its strikingly variegated colour pattern, bright green and black in most species when alive, often becoming yellowish and black in dried specimens. The nature of the mid tibial spurs enables males of *Dioncomena* to be readily distinguished from *Meruterrana* and *Pronomapyga*, in which the coloration is also conspicuously variegated.

In addition to the species treated below there are in the BMNH two males and four females of an undescribed species from Uganda in which the male mid tibiae have three much enlarged dorsal spurs towards the tip, in addition to the dorsal internal apical spur; all the male mid tibial spurs are hooked at the tip. I am not describing this species here as both the males are in very poor condition. I also have two females (on loan from the MRAC, Tervuren) from Kapanga in southern Zaire, which probably represent another unnamed species, but I am not describing it in the absence of the male sex.

DISTRIBUTION. The species treated below are all East African, their ranges extending from southern Kenya through Tanzania to Zambia, Malawi, Rhodesia and Mozambique. The two undescribed species mentioned above extend the range of the genus into Uganda and Zaire.

Key to the species of *Dioncomena*

Males

1 Fore wings with a shiny surface; most of the costal, radial and medial areas translucent with a regular, ladder-like arrangement of cross-veins . . . . **D. nitens** sp. n. (p. 131)

– Fore wings opaque with a matt surface and largely irregular cross-veins 2

2 Tenth abdominal tergite with a median dorsal protuberance, as in Fig. 85 . **D. bulla** sp. n. (p. 129)

– Tenth abdominal tergite without a median dorsal protuberance 3

3 Ninth abdominal tergite markedly produced posteriorly and profusely hairy above, as in Fig. 83 **D. zernyi** sp. n. (p. 127)

– Ninth abdominal tergite not or only slightly produced posteriorly, not hairy above. . . 4

4 Ninth abdominal tergite produced somewhat posteriorly, covering most of the tenth abdominal tergite, as in Fig. 81. Stridulatory file clearly divided into two parts, one with coarse and one with fine teeth, as in Fig. 102 . . . . **D. ornata** Brunner (p. 125)

– Ninth abdominal tergite unmodified, not covering most of the tenth abdominal tergite. Stridulatory file not clearly divided into two parts, teeth arranged as in Figs 103, 105 or 107 5

5 Pronotum without a dark median stripe (the only known male specimen has two dark lateral stripes, but this may not be a constant character). Stridulatory file less than 1·2 mm long, with fewer than 40 teeth . . . . **D. tanneri** sp. n. (p. 126)

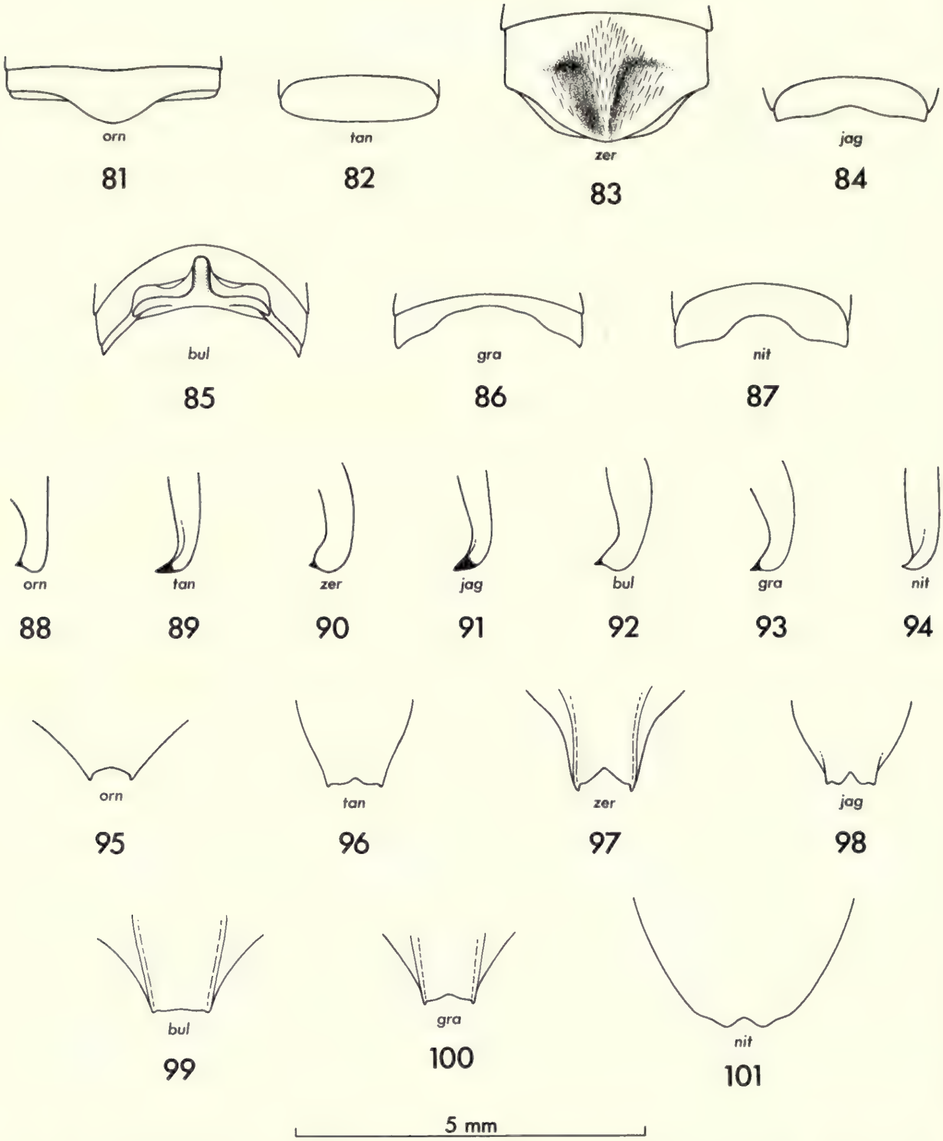
– Pronotum with a dark median stripe, at least in the anterior half. Stridulatory file more than 1·3 mm long, with more than 40 teeth 6

6 Dark median stripe on the pronotum extending to the hind margin (near which it becomes wider). Stridulatory file with fewer than 60 fairly evenly spaced teeth (Fig. 105) . . . . **D. jagoi** sp. n. (p. 128)

– Dark median stripe on the pronotum not extending to the hind margin. Stridulatory file with more than 70 teeth, arranged much more densely towards the centre (Fig. 107) . . . . **D. grandis** sp. n. (p. 130)

Females

Females of *Dioncomena* are not very easy to identify to species. Malawian specimens are likely to be *D. bulla* and those from Rhodesia or Mozambique will probably be *D. grandis*. Females of *D. jagoi* can be recognized by the dark median stripe extending the whole length of the pronotum. Other females with a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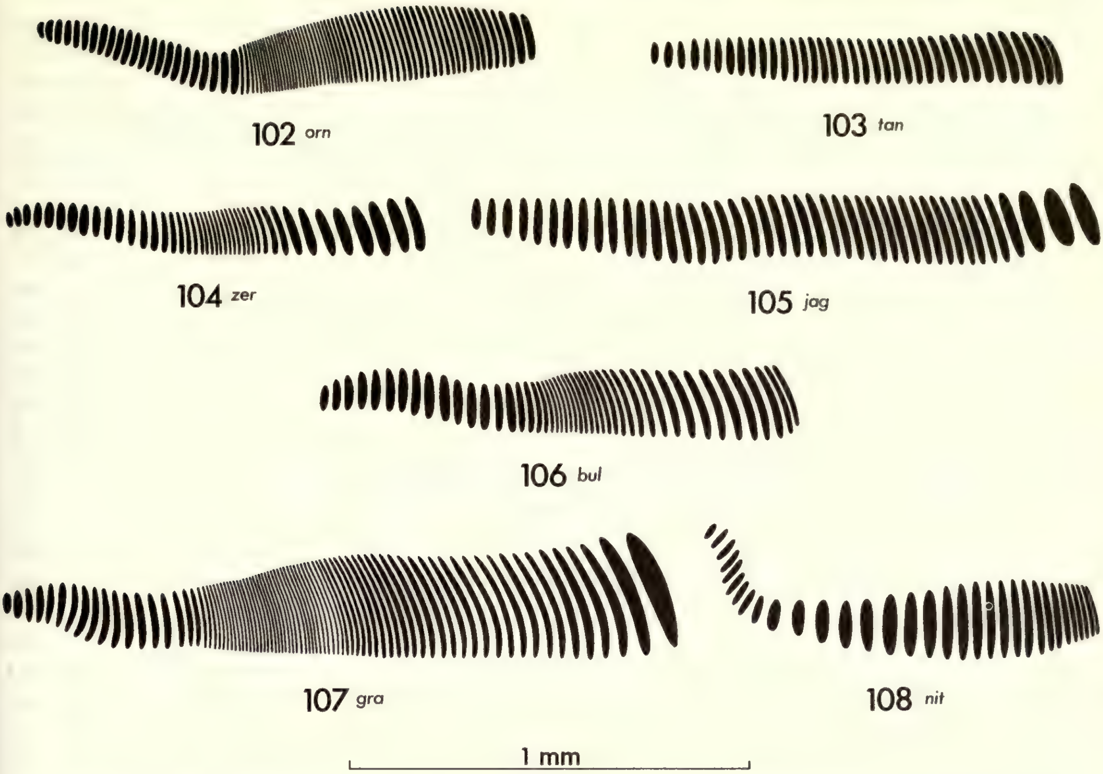
101
5 mm

Figs 81–101 *Dioncomena*. 81–87. Dorsal view of the male terminal abdominal tergites of (81) *D. ornata*; (82) *D. tanneri*; (83) *D. zernyi*; (84) *D. jagoi*; (85) *D. bulla*; (86) *D. grandis*; (87) *D. nitens*. 88–94. Dorsal view of the right male cercus of (88) *D. ornata*; (89) *D. tanneri*; (90) *D. zernyi*; (91) *D. jagoi*; (92) *D. bulla*; (93) *D. grandis*; (94) *D. nitens*. 95–101. Ventral view of the male subgenital plate of (95) *D. ornata*; (96) *D. tanneri*; (97) *D. zernyi*; (98) *D. jagoi*; (99) *D. bulla*; (100) *D. grandis*; (101) *D. nitens*.



Figs 102–108 Diagrams of the male stridulatory file of (102) *Dioncomena ornata*; (103) *D. tanneri*; (104) *D. zernyi*; (105) *D. jagoi*; (106) *D. bulla*; (107) *D. grandis*; (108) *D. nitens*.

dark median pronotal stripe not extending to the hind margin are most likely to be *D. ornata*, which is the most common and widespread species in Tanzania and the only species known from southern Kenya. Females from the western Usambara Mountains without a dark median stripe on the pronotum will probably be *D. tanneri*. The female is unknown in *D. nitens* and not known for certain in *D. zernyi*.

Dioncomena ornata Brunner

(Figs 80, 81, 88, 95, 102)

Dioncomena ornata Brunner, 1878: 208. LECTOTYPE ♂, TANZANIA: Zanzibar (NM, Vienna), here designated [examined].

Dioncomena superba Karsch, 1889: 449. LECTOTYPE ♂, TANZANIA: Usambara (MNHU, Berlin), here designated [examined]. **Syn. n.**

DIAGNOSIS. ♂. Stridulatory file with 80–100 teeth (mean of ten examined: 92), showing clear division into two parts, as in Fig. 102. Ninth abdominal tergite produced somewhat posteriorly, covering most of tenth abdominal tergite, as in Fig. 81. Cerci shaped as in Fig. 88. Subgenital plate shaped as in Fig. 95.

♀. No clear-cut diagnostic characters, but see below.

MEASUREMENTS

	Males	Females
Total length	(20): 23·8–27·9, mean 25·62	(20): 26·4–31·1, mean 28·38
Median length of pronotum	(20): 2·9–3·6, mean 3·25	(20): 2·7–3·2, mean 2·95
Length of hind femur	(20): 15·1–18·8, mean 16·68	(20): 17·6–19·9, mean 18·54
Length of fore wing	(20): 18·0–21·8, mean 19·41	(20): 19·2–24·3, mean 21·44
Length of stridulatory file	(10): 1·11–1·31, mean 1·22	
Length of ovipositor		(20): 3·7–4·1, mean 3·89

DISCUSSION. *D. ornata* is the most common and widespread species of the genus in Tanzania and is at present the only one known from Kenya. The male may be readily distinguished from all the other species by the shape of the ninth abdominal tergite. The female is more difficult to recognize, but has a smaller ovipositor than *D. tanneri* and is smaller in general size than *D. jagoi*; it also differs from these two species (which are the only other species in the genus that are known to overlap in range with *D. ornata*) in having a median dark stripe on the pronotum that does not normally reach the hind margin.

All the specimens I have examined from Zanzibar are much blacker in colour than mainland specimens: the head is mostly black, there are areas of black on the thoracic pleurites and the femora are almost entirely black. The type-series of *D. ornata* is from Zanzibar and shows this unusually dark colouring well. When Karsch (1889: 449) saw specimens with the normal mainland colouring from the Usambara Mountains and 'Bondei' (between the Usambara Mountains and the coast) he evidently considered them to be too different in colour to be conspecific and so proposed the name *superba* for them. It is quite clear from the hundred or so specimens I have examined that this difference is one of colour only (as was suggested by Brunner, 1891: 107) and that the type-series of these two nominal species are conspecific.

I have selected and labelled a male lectotype from the type-series (two males, one female) of *D. ornata*. I have not selected the male specimen bearing Brunner's reference number (10.282) as the characteristic ninth abdominal tergite is damaged in this specimen. The abdomen of the lectotype has broken off from the rest of the body and is separately mounted on the same pin; the genitalia are, however, undamaged and the rest of the specimen is in good condition.

I have selected and labelled a male lectotype from the type-series (three males, one female) of *D. superba*. I have not selected the male specimen (from 'Bondei') bearing the red 'Typus' label as one of the other male syntypes (from Usambara) is in better condition. All four specimens bear the number '5054'.

MATERIAL EXAMINED

Dioncomena ornata Brunner, lectotype ♂, **Tanzania**: Zanzibar (*Hildebrandt*) (NM, Vienna). *Dioncomena superba* Karsch, lectotype ♂, **Tanzania**: Usambara, ii–iii.1886 (*Schmidt*) (MNHU, Berlin).

Kenya: 1 ♂, Makindu Camp, 10.vii.1916 (*Anderson*); 2 ♀, Rabai, vi.1928 (*van Someren*); 2 ♂, Rabai, i–ii.1929 (*van Someren*); 1 ♂, Gasi, 1.xi.1927 (*van Someren*); 1 ♂, 2 ♀, Kwali Forest, 32 km W. of Mombasa, 1.vi.1948 (*Steele*); 2 ♀, Kwale, 450 m, 5.xi.1957 (*Ross & Leech*). **Tanzania**: 1 ♂, 1 ♀, Usambara, ii–iii.1886 (*Schmidt*) (MNHU, Berlin) (paralectotypes of *Dioncomena superba* Karsch); 1 ♂, 'Bondei', i.1886 (*Schmidt*) (MNHU, Berlin) (paralectotype of *Dioncomena superba* Karsch); 1 ♂, 1 ♀, Usambara, Nguelo (*Rolle*); 11 ♂, 10 ♀, Usambara Mts, near Amani, 9.xi.1964 (*Jago*); 1 ♂, 1 ♀, Amani, 850 m, 9.xi.1957 (*Ross & Leech*); 1 ♀, 16 km SE. of Amani, 160 m, 11.xi.1957 (*Ross & Leech*) (CAS, San Francisco); 1 ♂, E. Usambara Mts, Amani, Kizugu, 18–31.xii.1965 (*Jago*); 5 ♂, 3 ♀, E. Usambara Mts, Sigi, 18–31.xii.1965 (*Jago*); 1 ♂, Sigi, near Amani, 460 m, vii.1937 (*Burtt*); 1 ♂, Usambara, Mombo, vi (*Sjöstedt*) (MNHU, Berlin); 1 ♂, 10 km E. of Mombo, 830 m, 12.xi.1957 (*Ross & Leech*) (CAS, San Francisco); 1 ♀, Mhonda, 100 km SW. of Handeni, 400 m, 13.xi.1957 (*Ross & Leech*) (CAS, San Francisco); 1 ♀, Amboni Caves, Tanga, 40 m, 11.xi.1957 (*Ross & Leech*) (CAS, San Francisco); 1 ♀, Old Shinyanga, 20.ix.1937 (*Burtt*); 2 ♂, 2 ♀, Central, Ilonga, 16.vi.1967 (*Jago*); 5 ♂, 8 ♀, Nguru Mts, above Turiani, 6.xi.1964 (*Jago*); 1 ♂, Uluguru Mts, Kinole, xi.1930 (*Harris*); 2 ♂, [Udzungwa Range,] Ukami (NM, Vienna); 2 ♂, 1 ♀, 'Ukami-Berge' (*Staudinger*) (NM, Vienna); 1 ♀, Zanzibar, Chwaka, v.1954 (*Brown*); 4 ♀, Zanzibar, Chukwani, v.1954 (*Brown*); 1 ♂, Zanzibar, Bububu, N. side near pool, 1.vii.1966 (*Oliver & Mohamed*); 1 ♂, 1 ♀, Zanzibar (*Hildebrandt*) (NM, Vienna) (paralectotypes of *Dioncomena ornata* Brunner); 2 ♀, 'Zanzibarküste', 1888 (NM, Vienna).

In the BMNH unless otherwise stated.

DISTRIBUTION. *D. ornata* occurs widely in Tanzania (including Zanzibar island), and its range extends northwards into southern Kenya.

Dioncomena tanneri sp. n.

(Figs 82, 89, 96, 103)

DIAGNOSIS. ♂♀. Pronotum without dark median stripe. Stridulatory file of male relatively short and straight, with about 37 fairly evenly spaced teeth arranged as in Fig. 103. Male cerci shaped as in Fig. 89. Male subgenital plate shaped as in Fig. 96.

DESCRIPTION. ♂. Eyes oval.

Pronotum with posterior part of lateral lobes only slightly inflated. Fore coxae with very small spine. Fore and mid femora with variable number of ventral spinules. Hind femora with about 11–14 ventral spinules. Fore tibiae with about 5–6 external ventral spurs. Mid tibiae with about 7–8 external ventral spurs, more distal ones showing tendency to be hooked at tip; dorsal spurs and more distal internal ventral spurs also showing tendency to be hooked at tip. Hind tibiae with about 19–22 external dorsal spines. Fore wings with matt surface; stridulatory file with 37 teeth arranged as in Fig. 103.

Ninth and tenth abdominal tergites unmodified (Fig. 82). Cerci shaped as in Fig. 89. Subgenital plate shaped as in Fig. 96.

Coloration variegated mainly with green (often yellow in dried specimens) and black. Head mostly black above, pale with black stripes and patches elsewhere; antennae black with pale bands. Pronotum green with black stripes along sides of disc and black patch on lateral lobes. Sides of thorax mostly black with green patch on mesepisternum. Fore and mid femora black with green markings. Hind femora mostly green near base, becoming black distally. Tibiae and tarsi black. Fore wings mostly dark brown or black with green patch along base of *MA*. Abdomen black with broad green lateral stripe. Cerci green with dark tip. Subgenital plate black.

♀. As male except for fore wings, mid tibiae, genitalia and coloration. Mid tibial spurs without hooked tips. Coloration basically similar to male but generally paler, with more green and less black. Ovipositor probably green in life (mostly yellowish brown in dried specimen).

MEASUREMENTS

	Male	Female
Total length	25·6	27·0
Median length of pronotum	3·1	3·3
Length of hind femur	16·4	17·7
Length of fore wing	20·3	20·8
Length of stridulatory file	0·98	
Length of ovipositor		4·6

DISCUSSION. To judge from the only two known specimens of this species, the lack of a dark median stripe on the pronotum enables both sexes to be distinguished from *D. ornata* and *D. jagoi*, which are the only other species of the genus known to occur in the same region of Tanzania. It is otherwise superficially similar to *D. ornata* and *D. zernyi*, but differs markedly from the former in the structure of the stridulatory file, and from the latter in the male genitalia.

I am naming this species after Mr John Tanner, who owns the Mazumbai Estate where the two specimens of the type-series were collected.

MATERIAL EXAMINED

Holotype ♂, **Tanzania**: W. Usambara Mts, Mazumbai Forest Reserve, vi.1967 (*Jago*) (BMNH).
Paratype. **Tanzania**: 1 ♀, same data and depository as holotype.

DISTRIBUTION. Known only from the type-locality and quite possibly confined to the western Usambara Mountains.

***Dioncomena zernyi* sp. n.**

(Figs 83, 90, 97, 104)

DIAGNOSIS. ♂. Ninth abdominal tergite markedly produced posteriorly, covering most of tenth abdominal tergite, profusely hairy above (Fig. 83). Cerci shaped as in Fig. 90. Subgenital plate shaped as in Fig. 97. Stridulatory file with about 43 teeth arranged as in Fig. 104.

♀ not known for certain (see Discussion below).

DESCRIPTION. ♂. Eyes oval.

Pronotum with posterior part of lateral lobes moderately inflated. Fore coxae with small spine. Fore and mid femora with variable number of ventral spinules. [Right hind leg missing.] Left hind femur with 4 ventral spinules. [Right fore leg presumably regenerated: smaller than left one and lacking tympanum.] Left fore tibia with 5 external ventral spurs. [Left mid tibia missing.] Right mid tibia with 7 external ventral spurs; none of mid tibial spurs modified. Left hind tibia with 28 external dorsal spines. Fore wings with matt surface; stridulatory file with 43 teeth arranged as in Fig. 104.

Ninth abdominal tergite markedly produced posteriorly, covering most of tenth abdominal tergite, profusely hairy above (Fig. 83). Cerci shaped as in Fig. 90. Subgenital plate shaped as in Fig. 97.

Coloration yellow-brown (presumably green in life) with black markings. Head with black dorsal patch; antennae mostly black at base, becoming paler distally. Pronotum with dark median stripe not extending to posterior margin. Sides of thorax pale with black patch on mesepisternum. Mid and hind coxae with black ventral patch. Femora pale with black tips and further dark markings near tip. Tibiae reddish brown, becoming darker at tip; tympanal area of fore tibiae mostly black. Tarsi dark brown. Fore wings reddish brown with pale band along anterior margin; basal part of *Sc* and *R* black. Abdomen pale with black dorsal stripe. Cerci dark at tip. Subgenital plate becoming dark brown towards tip.

♀ not known for certain (see below).

MEASUREMENTS

	Male
Total length	28·0
Median length of pronotum	3·2
Length of hind femur	19·5
Length of fore wing	21·3
Length of stridulatory file	1·05

DISCUSSION. The much enlarged and profusely hairy ninth abdominal tergite enables the male of this species to be easily recognized.

The female is unknown for certain, but I have examined a female specimen from near the type-locality that may well be conspecific with the holotype. Its morphological features are generally similar, but it lacks the dark markings on the head, pronotal disc and mesepisternum, and the veins *Sc* and *R* are pale-coloured throughout their length; it is also rather smaller (total length 25·6 mm, median length of pronotum 2·9 mm, length of hind femur 16·1 mm, length of fore wing 19·5 mm, length of ovipositor 4·2 mm). The specimen belongs to the NM, Vienna and bears the following data: 'Tanganyika-Terr., Matengo-Hochland, wsw. v. Songea, Lupembe-Bg. 1800–2000 m 1.–10.II. '36. Zerny'.

MATERIAL EXAMINED

Holotype ♂, **Tanzania**: Lake Nyasa, 'Randberge', E. of Mbamba Bay, Mitomoni, 700–1100 m, 10–18.iv.1936 (*Zerny*) (NM, Vienna).

DISTRIBUTION. Known for certain only from the type-locality in the extreme south of Tanzania, but probably also occurs in Mozambique.

Dioncomena jagoi **sp. n.**

(Figs 84, 91, 98, 105)

DIAGNOSIS. ♂ ♀. Pronotum with dark median stripe extending along its whole length; posterior part of lateral lobes strongly inflated in male. Stridulatory area of male fore wings broad, stridulatory file with about 45–50 fairly evenly spaced teeth arranged as in Fig. 105. Male cerci shaped as in Fig. 91. Male subgenital plate shaped as in Fig. 98. Ovipositor less than sixth length of fore wings.

DESCRIPTION. ♂. Eyes oval.

Pronotum with posterior part of lateral lobes strongly inflated. Fore coxae with small spine. Fore and mid femora with variable number of ventral spinules. Hind femora with about 10–15 ventral spinules. Fore tibiae with about 5–6 external ventral spurs. Mid tibiae with 8–10 external ventral spurs, more distal ones hooked at tip and apical one somewhat enlarged; dorsal spurs and more distal internal ventral spurs also hooked at tip. Hind tibiae with about 24–28 external dorsal spines. Fore wings with matt surface; stridulatory area broad, stridulatory file with about 45–50 teeth (mean of 3 examined: 48) arranged as in Fig. 105.

Ninth abdominal tergite unmodified. Tenth abdominal tergite emarginate in middle (Fig. 84). Cerci shaped as in Fig. 91. Subgenital plate shaped as in Fig. 98.

Coloration variegated mainly with green (often yellow in dried specimens) and black. Head black above, front and sides green with black markings; antennae black at base becoming brown with some pale and darker bands. Pronotum green with black median stripe extending along its whole length, broadening towards hind margin. Sides of thorax black with green patches and markings. Fore and mid femora mainly black; hind femora mostly green in basal half, becoming black distally. Tibiae dark brown or black at base, becoming paler distally. Tarsi brown. Fore wings mostly dark brown or black, with green patches near base and green stripe along costal margin; exposed part of hind wings dark brown or black. Abdomen black with broad green stripe on each side. Cerci green with dark tip. Subgenital plate black with green patch on each side.

♀. As male except for pronotum, fore wings, mid tibiae and genitalia. Posterior part of pronotal lateral lobes not strongly inflated. Mid tibial spurs without hooked tips. Ovipositor probably green in life (orange-brown in dried specimens), with black base.

MEASUREMENTS

	Males	Females
Total length	(3): 29·0–30·3, mean 29·77	(4): 33·4–34·9, mean 33·98
Median length of pronotum	(3): 3·8–4·1, mean 3·90	(4): 3·4–3·6, mean 3·48
Length of hind femur	(3): 16·9–17·7, mean 17·27	(3): 17·5–18·9, mean 18·33
Length of fore wing	(3): 23·8–24·7, mean 24·23	(4): 26·5–27·9, mean 27·05
Length of stridulatory file	(3): 1·49–1·51, mean 1·50	
Length of ovipositor		(4): 3·9–4·0, mean 3·95

DISCUSSION. The continuous dark median stripe along the whole length of the pronotum provides a useful spot character for recognizing both sexes of this species. The male may also be recognized by the rather broad stridulatory organ and in particular the long stridulatory file with fairly evenly spaced teeth. The females have no striking morphological characteristics, but the ovipositor is unusually small for the genus (less than a sixth of the length of the fore wings in *D. jagoi*, more than a sixth in all the other species in which the female is known).

MATERIAL EXAMINED

Holotype ♂, **Tanzania**: Usambara Mts, near Amani, 9.xi.1964 (*Jago*) (BMNH).

Paratypes. **Tanzania**: 1 ♀, same data as holotype; 1 ♂, E. Usambara Mts, Kizugu, Amani, 18–31.xii.1965 (*Jago*); 1 ♂, E. Usambara Mts, Amani-Sigi Forest Reserve, 5.iv.1966 (*Jago*); 1 ♀, E. Usambara Mts, Lunguza Forest Reserve, Lower Forest, 15.iv.1966 (*Jago*); 1 ♀, Morogoro, Kimboza Forest, iv.1954 (*Pinhey*); 1 ♀, Uluguru Mts, Kimboza Forest, x.1951 (*Pinhey*).

All in the BMNH.

DISTRIBUTION. At present known only from the Usambara and Uluguru Mountains, but probably also occurs on other mountain ranges in eastern Tanzania.

Dioncomena bulla **sp. n.**

(Figs 85, 92, 99, 106)

DIAGNOSIS. ♂. Tenth abdominal tergite with strongly sclerotized median dorsal protuberance, directed anteriorly and partially overlapping ninth abdominal tergite, which is emarginate (Fig. 85). Cerci shaped as in Fig. 92. Subgenital plate shaped as in Fig. 99. Stridulatory file with about 45–55 teeth arranged as in Fig. 106.

♀. No clear-cut diagnostic characters, but see Discussion below.

DESCRIPTION. ♂. Eyes oval.

Pronotum with posterior part of lateral lobes moderately inflated. Fore coxae with quite well developed spine. Fore femora with about 2–4 ventral spinules. Mid femora usually with 1–2 ventral spinules. Hind femora with about 4–8 ventral spinules. Fore tibiae with about 5–6 external ventral spurs. Mid tibiae with about 8–10 external ventral spurs; none of mid tibial spurs modified. Hind tibiae with about 22–28 external dorsal spines. Fore wings with matt surface; stridulatory file with about 45–55 teeth (mean of 10 examined: 49) arranged as in Fig. 106.

Tenth abdominal tergite with strongly sclerotized median dorsal protuberance, directed anteriorly and partially overlapping ninth abdominal tergite, which is emarginate (Fig. 85). Cerci shaped as in Fig. 92. Subgenital plate shaped as in Fig. 99.

Coloration mostly yellow-brown (presumably green in life) with black markings. Head black dorsally; antennae mostly black with narrow pale bands and pale base to first segment. Pronotum with dark median stripe not extending to posterior margin. Sides of thorax without black markings. Mid and hind coxae with black ventral patch. Fore femora pale at base, becoming dark or with dark markings in distal half, tip black. Mid femora pale with black tip. Hind femora pale, becoming dark towards tip. Tibiae and tarsi mostly dark brown or black. Membrane of fore wings mostly dark-coloured with veins mostly pale-coloured; costal area mostly reddish with pale anterior margin. Abdomen pale with black dorsal stripe. Cerci dark at tip. Distal part of subgenital plate black.

♀. As male except for fore wings, genitalia and coloration. Coloration generally paler than male. Dark dorsal markings on head and pronotum much less extensive than in male. Tibiae mostly pale-coloured, becoming dark at tip. Ovipositor pale-coloured.

MEASUREMENTS

	Males	Females
Total length	(10): 24·5–28·8, mean 27·27	(2): 25·3–27·3, mean 26·30
Median length of pronotum	(12): 3·2–3·9, mean 3·54	(3): 2·8–3·4, mean 3·03
Length of hind femur	(11): 17·5–19·9, mean 18·60	(3): 16·9–19·2, mean 18·17
Length of fore wing	(11): 18·3–21·5, mean 20·45	(3): 19·1–21·2, mean 20·17
Length of stridulatory file	(10): 1·05–1·31, mean 1·19	
Length of ovipositor		(3): 4·2–4·5, mean 4·33

DISCUSSION. Males of this species may be easily recognized by the extraordinary protuberance on the tenth abdominal tergite, which is unique in the genus. The females are not so easily distinguishable; they are especially similar to the putative female of *D. zernyi* (see p. 129), with which they share the dark patches on the otherwise pale-coloured mid and hind coxae (*D. grandis* has these patches on the hind coxae only). However, *D. bulla* is at present the only species of *Dioncomena* known to occur in southern Malawi, and so females from this region are unlikely to belong to any of the other species.

MATERIAL EXAMINED

Holotype ♂, **Malawi**: 11 km S. of Cholo [Thyolo], 940 m, 25.ii.1958 (*Ross & Leech*) (CAS, San Francisco, Ent. Type no. 13177).

Paratypes. **Malawi**: 1 ♀, same data and depository as holotype; 1 ♂, Soche ('Sochi') Mtn, forest clearing, 30.iv.1967 (BMNH); 1 ♀, Soche summit, forest clearing, 30.iv.1967 (*Whellan*) (BMNH); 4 ♂, Lujere, Mlanje [Mulanje], 19.xii.1944 (1 in BMNH; rest in NM, Bulawayo); 6 ♂, 1 ♀, Lujere Tea Estate, Mt Mlanje, 6–8.xii.1970 (2 ♂ in BMNH; rest in NM, Bulawayo).

DISTRIBUTION. Known only from highlands in the Southern province of Malawi, but quite likely occurring in the surrounding parts of Mozambique.

Dioncomena grandis sp. n.

(Figs 86, 93, 100, 107)

DIAGNOSIS. ♂. Stridulatory file usually more than 1·5 mm long, with about 75–90 stridulatory teeth arranged as in Fig. 107. Cerci shaped as in Fig. 93. Subgenital plate shaped as in Fig. 100.

♀. No clear-cut diagnostic characters, but total length usually more than 30 mm and length of ovipositor more than 4·5 mm (see also Discussion below).

DESCRIPTION. ♂. Eyes oval.

Pronotum with posterior part of lateral lobes inflated. Fore coxae with quite well developed spine. Fore and mid femora with variable number of ventral spinules. Hind femora with about 6–15 ventral spinules. Fore tibiae with about 6–8 external ventral spurs. Mid tibiae with about 9–11 external ventral spurs; none of mid tibial spurs modified. Hind tibiae with about 25–30 external dorsal spines. Fore wings with matt surface; stridulatory file with about 75–90 teeth (mean of 10 examined: 81) arranged as in Fig. 107.

Ninth abdominal tergite unmodified. Tenth abdominal tergite emarginate, as in Fig. 86. Cerci shaped as in Fig. 93. Subgenital plate shaped as in Fig. 100.

Coloration mostly yellow-brown (green in life and in some dried specimens) with black markings. Head black dorsally; antennae mostly black with few narrow pale bands. Pronotum with dark median stripe not extending to posterior margin. Sides of thorax with or without dark markings. Hind coxae with black ventral patch. Fore femora pale at base, becoming dark (at least dorsally) towards tip, which is black. Tibiae and tarsi mostly dark brown or black; hind tibiae with pale band towards tip. Membrane of fore wings mostly dark-coloured with veins mostly pale-coloured; costal area mostly reddish with pale anterior margin. Abdomen pale with black dorsal stripe. Cerci dark at tip. Distal part of subgenital plate black.

♀. As male except for fore wings, genitalia and coloration. Coloration generally rather paler than male. Dark dorsal markings on head and pronotum usually less extensive than in male, sometimes almost absent. Ovipositor pale-coloured.

MEASUREMENTS

	Males	Females
Total length	(9): 30·2–33·9, mean 31·81	(16): 31·1–37·7, mean 33·79
Median length of pronotum	(14): 3·5–4·3, mean 3·89	(17): 3·0–4·0, mean 3·46
Length of hind femur	(14): 18·5–20·4, mean 19·71	(18): 20·5–23·8, mean 21·93
Length of fore wing	(14): 22·7–25·8, mean 23·96	(20): 24·4–29·0, mean 26·06
Length of stridulatory file	(10): 1·50–1·70, mean 1·60	
Length of ovipositor		(19): 4·7–5·0, mean 4·91

DISCUSSION. With a total length of more than 30 mm this species is the largest in the genus except for *D. jagoi*, from which it differs markedly in coloration, genitalia and stridulatory organ. It is at present known only from a small area of eastern Rhodesia and the neighbouring part of Mozambique, in which region no other species of *Dioncomena* is known to occur.

MATERIAL EXAMINED

Holotype ♂, **Rhodesia**: Chirinda Forest, 29 km S. of Chipinga, 1110 m, 18.iii.1958 (*Ross & Leech*) (CAS, San Francisco, Ent. Type no. 13178).

Paratypes. **Rhodesia**: 8 ♀, same data as holotype (2 in BMNH; rest in CAS, San Francisco); 1 ♂, Chirinda Forest, 25.iii–2.v.1907 (*Swynnerton*); 1 ♂, Chirinda Forest, 1160 m, 3.iv.1910 (*Swynnerton*); 1 ♀, near Chirinda, 1160 m, 11.iv.1909 (*Swynnerton*); 2 ♀, Mt Chirinda, x–xi.1911 (*Swynnerton*); 1 ♂, Chirinda Forest, xii.1937 (*van Son*) (TM, Pretoria); 2 ♀, Mt Selinda, 9–17.iv.1956 (*v. Son & Vári*) (1 in BMNH; 1 in TM, Pretoria); 2 ♂, 1 ♀, Mt Selinda, 17–31.i.1959 (*van Son*) (1 ♂ in BMNH; 1 ♂, 1 ♀ in TM, Pretoria); 1 ♂, 1 ♀, Mt Selinda, S. Melsetter, i.1966 (NM, Bulawayo); 1 ♂, 2 ♀, Mount Selinda, Melsetter, ii.1961 (NM, Bulawayo); 1 ♂, Vumba Mts, Umtali, 11.1961 (NM, Bulawayo); 1 ♀, Bazley Bridge, Odzi River, Umtali, 16.ii.1961 (NM, Bulawayo). **Mozambique**: 3 ♂, 2 ♀, Mussapa R. Forest, Serra Rotanda, 13–17.iii.1973 (*Pinhey & de Moor*) (1 ♂, 1 ♀ in BMNH; rest in NM, Bulawayo); 2 ♂, 4 ♀, Serra Rotanda, E. of Chimanimani Mts, 2–7.iii.1970 (*Pinhey*) (1 ♂, 1 ♀ in BMNH; rest in NM, Bulawayo).

In the BMNH unless otherwise stated.

DISTRIBUTION. Known only from a small upland area of Manicaland in eastern Rhodesia, stretching from Umtali in the north to Mt Selinda in the south, and also from the immediately adjacent part of Mozambique. The species quite possibly also occurs in the uplands of Manicaland north of Umtali.

Dioncomena nitens sp. n.

(Figs 87, 94, 101, 108)

DIAGNOSIS. ♂. Eyes almost circular. Pronotum without dark median stripe; posterior part of lateral lobes strongly inflated. Fore wings with shiny surface; most of costal, radial and medial areas translucent with regular, ladder-like arrangement of cross-veins. Stridulatory file bent downwards towards distal end, with about 33 teeth arranged as in Fig. 108. Cerci shaped as in Fig. 94. Subgenital plate shaped as in Fig. 101.

♀ unknown.

DESCRIPTION. ♂. Eyes almost circular.

Pronotum with posterior part of lateral lobes strongly inflated. Fore coxae without spine. Fore femora with 1–2 ventral spinules. Mid femora unarmed. Hind femora with about 10–12 ventral spinules. Fore tibiae with 4 external ventral spurs. Mid tibiae with 4 external ventral spurs, excluding apical ones, and with 3 external and 2 internal apical spurs; middle external apical spur and ventral internal apical spur somewhat enlarged; all mid tibial spurs (including dorsal ones) hooked at tip. Hind tibiae with about 24–25 external dorsal spines. Fore wings with shiny surface; most of costal, radial and medial areas translucent with regular, ladder-like arrangement of cross-veins, but basal sixth and distal third (and exposed part of hind wings) with irregular archedictyon. Stridulatory file bent downwards towards distal end, with about 33 teeth arranged as in Fig. 108.

Ninth abdominal tergite unmodified. Tenth abdominal tergite emarginate in middle (Fig. 87). Cerci shaped as in Fig. 94. Subgenital plate shaped as in Fig. 101.

Coloration variegated mainly with green, cream and dark brown. Head red-brown in front, greenish brown above and on sides; antennae reddish brown with darker bands. Pronotum yellowish cream above with median green stripe, lateral lobes becoming black ventrally; hind margin of disc black. Sides of thorax black with large cream patches. Femora green, darkening to dark brown towards tip. Tibiae dark brown to black. Tarsi brown. Fore wings and exposed part of hind wings mostly brown; left fore wing green in stridulatory region. Abdomen green dorsally shading to cream dorsolaterally; lower part of sides dark brown. Cerci green with dark tip. Subgenital plate dark brown to black. [Description of colour based mainly on colour photograph of freshly killed holotype; green colour lost in dried specimen.]

♀ unknown.

MEASUREMENTS

	Male
Total length	27·4
Median length of pronotum	3·4
Length of hind femur	15·8
Length of fore wing	20·0

DISCUSSION. Males of this species may be easily recognized by the shiny fore wings and their characteristic venation. The absence of a dark median stripe on the pronotum is also unusual in the genus.

MATERIAL EXAMINED

Holotype ♂, **Zambia**: 16 km from Mbala ('Abercorn'), Sizi Forest, Kalambo Falls – 'Abercorn' road, near Fse Fse barrier, 19.v.1966 (*Jago*) (BMNH).

DISTRIBUTION. The holotype is unique.

GABONELLA Uvarov

Gabonia Bolívar, 1906: 327. Type-species: *Gabonia cothurnata* Bolívar, by monotypy. [Homonym of *Gabonia* Jacoby, 1893: 101.]

Gabonella Uvarov, 1940: 174. [Replacement name for *Gabonia* Bolívar.]

♂♀. Fastigium of vertex compressed, narrower than first antennal segment, more or less sulcate above, concave in profile. Eyes slightly oval, very prominent. Pronotum without lateral carinae, surface smooth and matt. Fore coxae without spine. Fore and mid femora with one ventral spinule or unarmed. Hind femora with ventral spinules and with extended dorsal point at tip. Fore tibiae with open tympanum on each side. Fore and mid tibiae without dorsal spurs. Hind tibiae with three apical spurs on each side. Both pairs of wings fully developed. Fore wings matt and opaque; *Sc* and *R* separate from base. Male tenth abdominal tergite produced somewhat posteriorly. Male subgenital plate without styles. Ovipositor well developed, with fine teeth.

DISCUSSION. Both sexes of the only known species of *Gabonella* are most easily recognized by their variegated colour pattern and the extended dorsal point on the tip of the hind femora. The size and coloration are reminiscent of the East African genus *Dioncomena*, which, however, lacks the pointed tip on the hind femora.

DISTRIBUTION. Cameroun, Congo and northern Zaire.

Gabonella cothurnata (Bolívar)

(Fig. 109)

Gabonia cothurnata Bolívar, 1906: 328. 2 ♂, 3 ♀ syntypes, CAMEROUN (IEE, Madrid) [examined].

Himerta feana Griffini, 1906: 380. Holotype ♂, CONGO: Nkogo (MCSN, Genoa) [examined]. **Syn. n.**

DISCUSSION. It is quite clear from an examination of the type-material that these two names, published in the same year, are synonymous. The stated publication date of *G. cothurnata* was 1 August 1906. The name *Himerta feana* was published on p. 380 of a paper dated 5 August 1906 on p. 369 and 15 August 1906 on p. 385; this name is thus the junior synonym by a very small margin. It follows from this synonymy that the genus *Himerta* Brunner (a junior homonym of *Himerta* Foerster; replaced by *Himertula* Uvarov) is no longer represented in Africa.

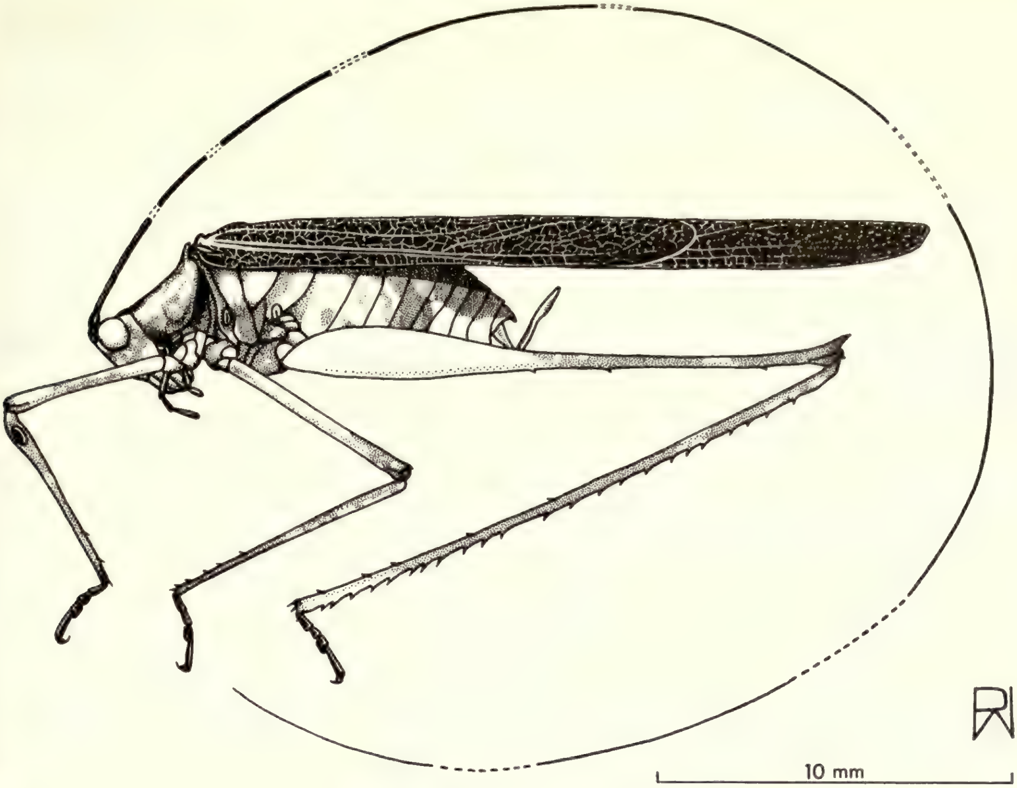


Fig. 109 *Gabonella cothurnata*, male.

MATERIAL EXAMINED

Gabonia cothurnata Bolivar, 2 ♂, 3 ♀ syntypes, **Cameroun** (*Conradt*) (IEE, Madrid). *Himerta feana* Griffini, holotype ♂, **Congo**: Nkogo, xii.1902 (*Fea*) (MCSN, Genoa).

Cameroun: 1 ♀, Kumba, 20.x.1949 (*Oldroyd*) (BMNH); 1 ♀, Molundu, xii.1910–i.1911 (*Schultze*) (ANS, Philadelphia); 2 ♂, 1 ♀, Edea, vi.1922 (*Reis*) (1 ♂ in BMNH; 1 ♂, 1 ♀ in ANS, Philadelphia). **Zaire**: Equateur, Boende, 2.iii.1926 (*Hulstaert*) (BMNH).

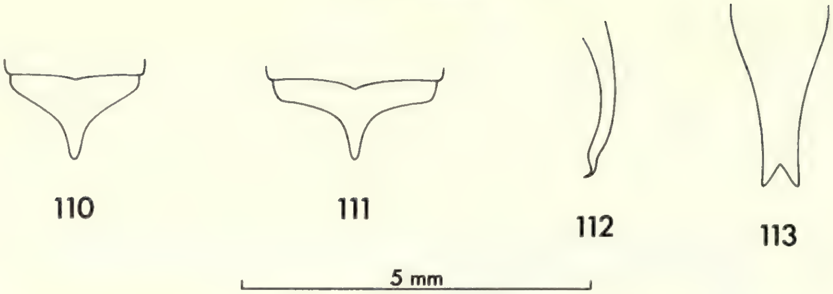
DISTRIBUTION. As given for the genus.

SCOLOCERCA gen. n.

Type-species: *Scolocerca fusciala* sp. n.

♂ ♀. Fastigium of vertex about as broad as first antennal segment, sulcate above. Eyes circular or almost so, prominent. Pronotum without lateral carinae, surface smooth and matt. Fore coxae with spine. Fore and mid femora unarmed. Hind femora with ventral spinules. Fore tibiae with open tympanum on each side. Fore and mid tibiae without dorsal spurs except at apex. Hind tibiae with three apical spurs on each side. Both pairs of wings fully developed. Fore wings slightly shiny, fairly translucent in anterior part, becoming opaque in posterior part; *Sc* and *R* separate from base, more or less equidistant from each other for most of their length. Ninth abdominal tergite produced posteriorly into pointed median projection (Figs 110, 111), downcurved at tip. Male tenth abdominal tergite unmodified. Male subgenital plate without styles. Ovipositor well developed, with fine teeth.

DISCUSSION. This genus resembles *Phaneroptera* and *Eulioptera* in general appearance, but the fastigium of the vertex is much broader and quite different in shape. Among other African Phaneropterinae, a median projection from the ninth abdominal tergite is found only in



Figs 110–113 *Scolocerca fusciala.* 110, 111. Dorsal view of the ninth abdominal tergite of (110) the male and (111) the female. 112. Dorsal view of the right male cercus. 113. Ventral view of the male subgenital plate.

Bueacola, which is quite different in most other characters (e.g. vertex, pronotum and wing-venation).

DISTRIBUTION. West Africa, from Sierra Leone to Ghana.

Scolocerca fusciala sp. n.

(Figs 110–113)

♂. Hind femora with about 3–9 ventral spinules. Fore tibiae with 4–5 external ventral spurs. Mid tibiae with 7 external ventral spurs. Hind tibiae with about 20–32 external dorsal spines. Hind wings extending beyond fore wings by about third length of latter.

Ninth abdominal tergite shaped as in Fig. 110. Cerci shaped as in Fig. 112. Subgenital plate shaped as in Fig. 113.

General coloration green, with dark brown or red-brown spots on most of thorax, abdomen and femora. First antennal segment green; second segment largely dark brown or black; remainder of antennae fairly pale at base, becoming dark with narrow pale bands distally. Femoral and tibial spines and spurs with dark tips. Veins and veinlets of fore wings mostly green, becoming dark red towards posterior margin; membrane colourless in anterior part, becoming dark brown or black in posterior part. Hind wings with *C*, *Sc*, *R*, *M* and *MA* mostly red, remaining veins and veinlets reddish near base of wing, dark-coloured elsewhere; membrane of cubito-anal fan somewhat darkened distally; exposed part of hind wings largely dark brown or black, with green or reddish veins and veinlets. Abdomen becoming dark red dorsally towards tip. Cerci mostly dark red.

♀. As male except for fore wings and genitalia. Ninth abdominal tergite similar to that of male, but median projection not quite as long (Fig. 111). Ovipositor *Phaneroptera*-like with more or less distinct angle near base of dorsal margin; basal plates produced ventrally somewhat. Subgenital plate simple, triangular.

MEASUREMENTS

	Male	Females
Total length	27·3	(5): 27·5–28·3, mean 27·82
Median length of pronotum	3·4	(6): 3·4–3·6, mean 3·48
Length of hind femur	17·6	(5): 18·3–19·4, mean 19·00
Length of fore wing	17·6	(6): 18·1–18·9, mean 18·47
Length of ovipositor		(6): 5·5–5·9, mean 5·73

DISCUSSION. In West Africa, to which it appears to be confined, this species might easily be mistaken at first sight for *Phaneroptera sparsa*, but the reddish colouring along the hind margin of the fore wings, the broad fastigium of the vertex and the projection from the ninth abdominal tergite are all characteristics of *S. fusciala*.

MATERIAL EXAMINED

Holotype ♂, **Ghana**: 5°23′N, 2°28′W [Western Region], forest, i.1968 (*Cole*) (BMNH).

Paratypes. **Sierra Leone**: 1 ♀, Njala, 27.vii.1928 (*Hargreaves*). **Liberia**: 3 ♀, N. of Monrovia, Bomi Hills, 8 km N. of Mines, 23.vii.1963 (*Jago*). **Ivory Coast**: 1 ♀, Man, 12.v.1964 (*Gillon*) (Coll. Gillon). **Ghana**: 1 ♀,

Western Region, 8 km W. of Tano River ferry, Asankrangua – Enchi road, 12.vii.1962 (*Jago*).
In the BMNH unless otherwise stated.

DISTRIBUTION. As given for the genus. There is some indication from the small number of specimens available that *S. fusciala* is associated more with forest than with savanna.

PHANEROPTERA Serville

Phaneroptera Serville, 1831: 158. Type-species: *Gryllus falcata* Poda, by subsequent designation (Hemming, 1944: 211).

Dannfeltia Sjöstedt, 1901: 19. Type-species: *Dannfeltia nana* Sjöstedt [= *Phaneroptera sparsa* Stål], by monotypy. **Syn. n.**

Anerota Caudell, 1921: 488. Type-species: *Gryllus falcata* Poda, by original designation.

Paranerota Karny, 1926*b*: 105. Type-species: *Phaneroptera gracilis* Burmeister, by original designation.

Euanerota Karny, 1927: 12. Type-species: *Phaneroptera brevis* Serville, by tentative original designation (see Ragge, 1956: 206).

♂ ♀. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above. Eyes slightly oval, prominent. Pronotum without lateral carinae, surface smooth and matt. Fore coxae usually with spine. Femora usually unarmed but sometimes with few very small ventral spinules. Fore tibiae with open tympanum on each side. Fore and mid tibiae without dorsal spurs except (usually) at apex. Hind tibiae with three apical spurs on each side (except *P. albida*, which has two). Both pairs of wings fully developed. Fore wings usually matt (slightly shiny in *P. acaciae* and *P. fragilis*); *Sc* and *R* more or less separate from base, but often closely approximated for proximal half of their length and sometimes virtually contiguous. Male tenth abdominal tergite usually unmodified but sometimes enlarged. Male subgenital plate without styles. Ovipositor well developed, with fine teeth or crenulation.

DISCUSSION. *Phaneroptera* is a rather nondescript genus, chiefly recognizable from its lack of any striking features. In both *Phaneroptera* and the related genus *Eulioptera* the hind wings usually extend further beyond the fore wings than is usual in the Phaneropterinae, and in this respect

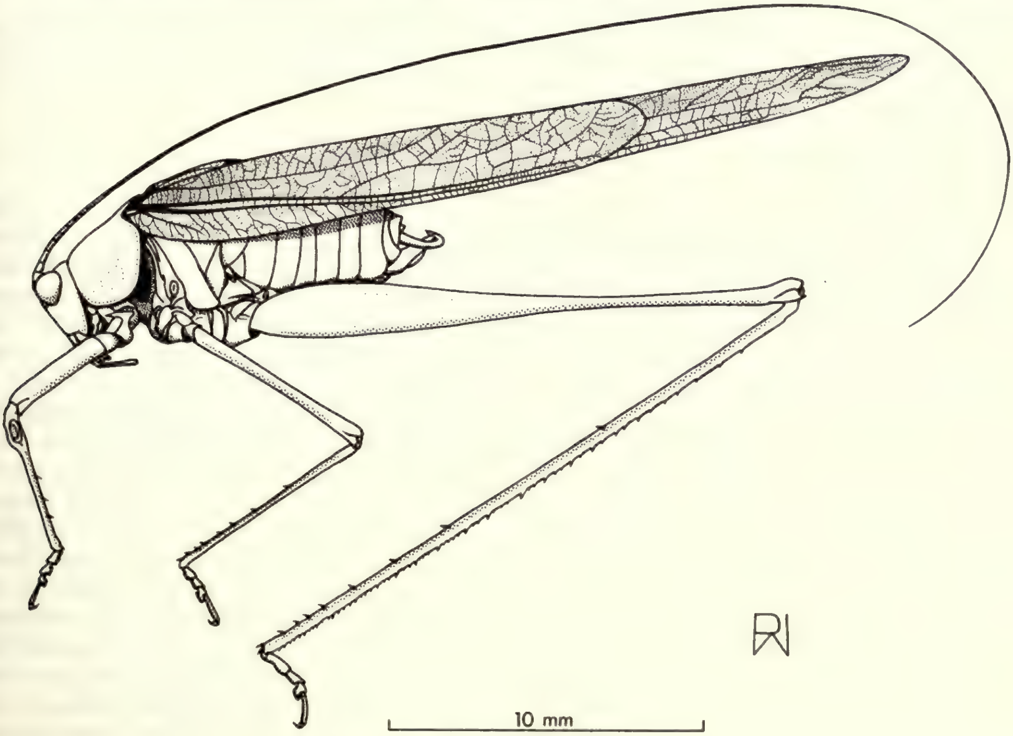


Fig. 114 *Phaneroptera sparsa*, male.

they resemble *Tylopsis* Fieber; they may, however, be easily distinguished from *Tylopsis* by the open tympana on the fore tibiae. *Phaneroptera* may be separated from *Eulioptera* by the opaque fore wings, at least posterior to vein *R* (see further discussion on p. 138). A revised key to the species is given by Ragge (1960*b*).

The synonymy of *Dannfeltia* with *Phaneroptera* follows from the synonymy of its type-species, *D. nana*, with *P. sparsa* (see p. 137).

DISTRIBUTION. Almost the whole of the Old World south of latitude 55°N, including all Africa.

INCLUDED AFRICAN SPECIES. *P. acaciae* Chopard, *P. albida* Walker, *P. fragilis* Ragge, *P. gracilis* Burmeister, *P. longispina* Ragge, *P. maculosa* Ragge, *P. magna* Ragge, *P. minima* Brunner, *P. nana* Fieber, *P. nigropunctata* Chopard, *P. parva* Ragge, *P. sparsa* Stål.

Since my revision of this genus (Ragge, 1956) and two supplementary papers (Ragge, 1957*b*; 1960*b*), additional information has become available on the following species.

***Phaneroptera sparsa* Stål stat. rev.**

(Fig. 114)

Phaneroptera sparsa Stål, 1856: 170. Holotype ♀, SOUTH AFRICA: Natal, Durban (NR, Stockholm) [examined].

Phaneroptera lurida Walker, 1869*b*: 339. Holotype ♂, 'W. AFRICA' (erroneously cited as 'Natal' in original description) (BMNH) [examined].

Phaneroptera tetrasticta Gerstaecker, 1869: 215. Holotype ♂, TANZANIA: Uru (NMHU, Berlin) [examined].

Phaneroptera conspersa Stål, 1874: 29 (apparently proposed unnecessarily as replacement name for *Phaneroptera sparsa* Stål).

Phaneroptera punctulata Burr, *in* Peel *et al.*, 1900: 41. Holotype ♂, ETHIOPIA: Whardi Datal (UM, Oxford) [examined].

Dannfeltia nana Sjöstedt, 1901: 19. Holotype ♂, 'CONGO' (*Dannfelt*) (NM, Stockholm) [examined]. **Syn. n.** [Also secondary homonym of *Phaneroptera nana* Fieber, 1853.]

Phaneroptera tenuicerca Ramme, 1951: 348. Holotype ♂, LEBANON: Djezin (NMHU, Berlin) [examined].

Phaneroptera bivittata Bei-Bienko, 1954: 74. Holotype ♂, U.S.S.R.: Armenia, Dhuga, near Dzhulfa, on R. Araks (ZI, Leningrad).

Phaneroptera nana sparsa Stål; Ragge, 1956: 235.

Phaneroptera africana Steinmann, 1966: 411. Holotype ♂, GUINEA: Conakry, 31.iii.1961 (*Gyáros*) (TM, Budapest) [examined]. **Syn. n.**

In my 1956 revision I treated this taxon as a southern subspecies of *P. nana* Fieber, its range including most of Africa and extending north-eastwards through the Arabian Peninsula and Mesopotamia to eastern Anatolia. At that time *nana* and *sparsa* appeared to be completely allopatric (although occurring close together in the Levant) and treating them as subspecies circumvented a particularly undesirable upheaval in nomenclature resulting from new synonymy. However, during a visit to Spain in 1962 I found that *sparsa* occurred in the south-eastern part of this country, in the region extending from Almería to Valencia, and an examination of the collection of the IEE, Madrid, revealed specimens of *sparsa* from Melilla and Mogador in Morocco. As *nana* was also known to occur in Spain and Morocco it became clear that there was an overlap in the ranges of the two forms at the western end of the Mediterranean Region, and I suggested (Ragge, 1965) that it might therefore be preferable to regard them as distinct species. More recently, Dr M. P. Pener and Mr Y. Ayal of the Hebrew University, Jerusalem, have been examining the status of *nana* and *sparsa* in Israel, where they both occur. Mr Ayal has found that the two forms will intercopulate when kept in small cages in the laboratory, but that any offspring were females resembling the female parent and therefore probably produced parthenogenetically; interspecific copulation was in any case much less frequent than intraspecific copulation and was followed by the production of far fewer eggs. I am most grateful to Dr Pener for sending me this information, which leaves me no longer in any doubt that these forms should be restored to the status of full species. It follows from this that the known distribution of *P. nana* in Africa is restricted to Morocco, northern Algeria, Tunisia and northern Egypt; *P. sparsa* occurs in Morocco, Western Sahara (Ragge, 1965) and most of Africa south of the 15°N line of latitude.

Through the courtesy of the late Mr B. Hanson of the NR, Stockholm, I have been able to examine the holotype of *Dannfeltia nana* Sjöstedt, and Dr H. Steinmann of the TM, Budapest, has kindly lent me the holotype of *P. africana* Steinmann. I am satisfied that these specimens, both male, belong to *P. sparsa*, though the cerci of the holotype of *P. africana* are unusually attenuate at the tip (similar in shape to the cercus shown in fig. 100f of my 1956 revision).

Phaneroptera magna Ragge

Phaneroptera magna Ragge, 1956: 242.

At the time of my 1956 revision this species was known only from Cameroun, Uganda, Zaire and Angola. Among material kindly lent to me by the late Dr H. J. Grant of the ANS, Philadelphia, there are specimens of *P. magna* from Nola, Sanga River, Congo (Brazzaville) and Broken Hill, Zambia.

Phaneroptera maculosa Ragge

Phaneroptera maculosa Ragge, 1956: 243.

This species was described from a unique male holotype from Lolodorf, Cameroun. I have now seen five further male specimens from Efulen, Cameroun, and near Irumu in north-eastern Zaire, all on loan from the ANS, Philadelphia through the courtesy of the late Dr H. J. Grant. These specimens are rather variable in colour pattern but are all conspicuously mottled; most of them lack the ventral spinules on the hind femora that are present in the holotype.

EULIOPTERA Ragge

Eulioptera Ragge, 1956: 266. Type-species: *Phaneroptera reticulata* Brunner, by original designation.

♂♀. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above. Eyes circular or slightly oval, prominent. Pronotum without lateral carinae, surface smooth and matt. Fore coxal spine varying in different species from very small to well developed. Femora unarmed or with ventral spinules. Fore tibiae with open tympanum on each side. Fore and mid tibiae without dorsal spurs except sometimes at apex. Hind tibiae with 1–3 apical spurs on each side. Both pairs of wings fully developed. Fore wings

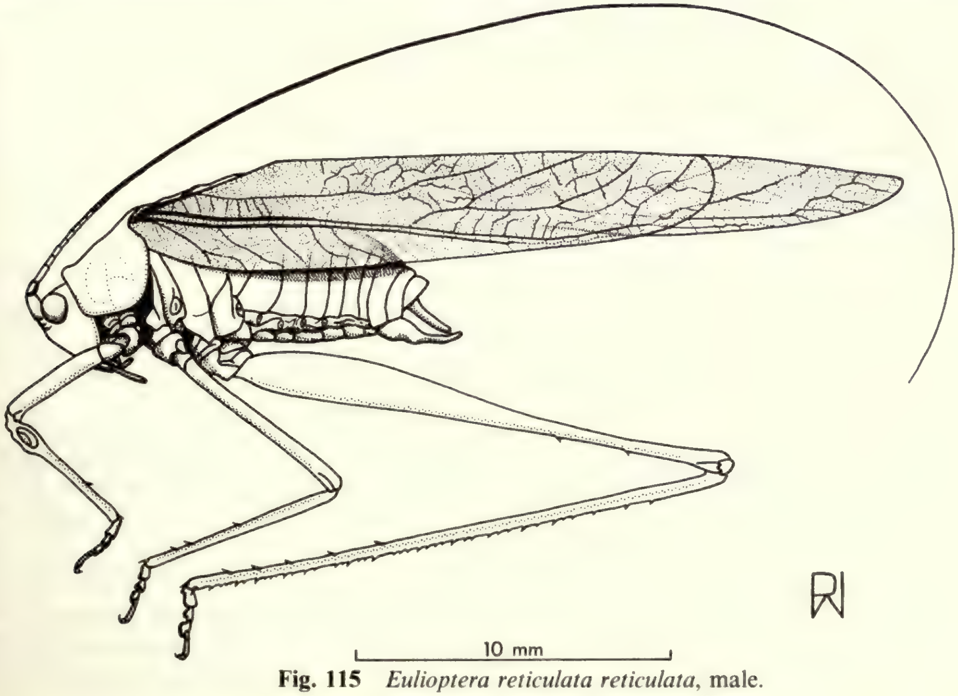


Fig. 115 *Eulioptera reticulata reticulata*, male.

more or less shiny and transparent, especially towards tip; *Sc* and *R* either separate for whole of their length, or separate at base and then contiguous or almost so for part of their length before diverging distally. Tenth abdominal tergite unmodified, incised or with median posterior projection. Male subgenital plate without styles. Ovipositor well developed, with fine teeth.

Discussion. This genus is closely similar to *Phaneroptera* and is equally widespread in tropical Africa. At the time of its original description in 1956 it contained four species and was clearly separated from *Phaneroptera* by the combination of shiny, translucent fore wings and two (instead of three) apical spurs on each side of the hind tibiae. However, I now have material of more than a dozen previously undescribed species that seem best assigned to *Eulioptera* on the basis of their shiny, translucent fore wings, and five of these have three apical spurs on each side of the hind tibiae. The distinction between these two genera has thus become less clear and it has become questionable whether *Eulioptera* is worth retaining as a separate genus. I have decided, at least for the time being, to regard the shiny, translucent fore wings, which I have always used as a simple means of recognizing *Eulioptera* with the unaided eye, as an adequate generic character, and therefore to continue to give *Eulioptera* the status of a separate genus in this review. With the two genera separated on this basis, *Phaneroptera fragilis* becomes intermediate between them to the extent that its fore wings are distinctly shinier and more translucent than is usual in *Phaneroptera*, though not being fully typical of *Eulioptera* in these respects.

It is quite possible that *Pyrrhizia zanzibarica* Brunner (1891: 55), hitherto placed in *Letana*, belongs to *Eulioptera*. Unfortunately the male holotype, described from 'Zanzibar', is lost and it is impossible to be certain of its identity from the original description. Nevertheless, Brunner admits that the subgenital plate is not of the type normally found in males of *Pyrrhizia* (= *Letana*) and I am provisionally transferring it, as a nomen dubium, to *Eulioptera*, to form the new combination *Eulioptera zanzibarica* (Brunner) **comb. n.** The only other African species previously assigned to *Letana* is *Pyrrhicia conradti* Bolívar, which I have used as the basis of the new genus *Pleothrix* (p. 162). *Letana* thus reverts to being an exclusively Oriental genus.

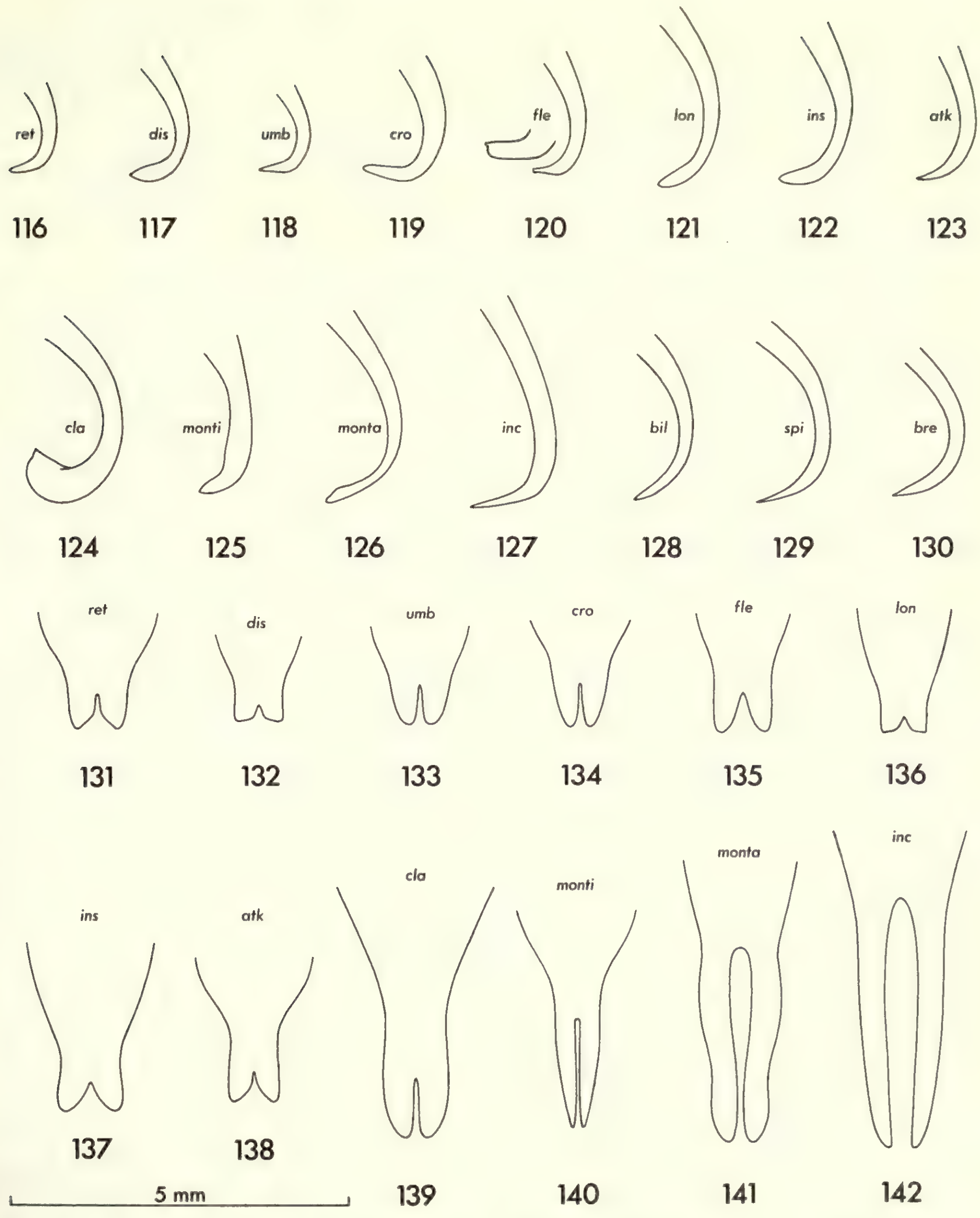
Some of the new species of *Eulioptera* described below are not very clearly distinguished by their more readily examined characters and I have found it necessary to make use of the stridulatory file of the male in establishing their specific status. This character has proved to show striking differences between species that are quite similar in male genitalia and in which the females seem sometimes to be indistinguishable (see p. 141 for further discussion).

Distribution. *Eulioptera* occurs throughout tropical Africa and in the eastern part of South Africa.

Key to the species of *Eulioptera*

Males

1 Tenth abdominal tergite extended posteriorly or deeply incised 2
– Tenth abdominal tergite unmodified 5
2 Tenth abdominal tergite not extended posteriorly, deeply incised, as in Fig. 143 ***E. incisa*** sp. n. (p. 156)
– Tenth abdominal tergite extended posteriorly, as in Figs 144, 145 or 146 3
3 Tenth abdominal tergite shaped as in Fig. 144. Hind tibiae with no dorsal apical spurs ***E. bilobata*** sp. n. (p. 156)
– Tenth abdominal tergite shaped as in Figs 145 or 146. Hind tibiae with a dorsal apical spur on each side 4
4 Hind wings extending more than 22 mm from the hind margin of the pronotal disc, projecting beyond the fore wings by at least a quarter of the length of the latter ***E. spinulosa*** Ragge (p. 157)
– Hind wings extending less than 21 mm from the hind margin of the pronotal disc, projecting beyond the fore wings by less than a fifth of the length of the latter . ***E. breviala*** Ragge (p. 158)
5 Hind tibiae with only 1 apical spur (the ventral one) on each side. (Islands in the Gulf of Guinea) . . . . ***E. insularis*** sp. n. (p. 152)
– Hind tibiae with 2–3 apical spurs on each side 6
6 Fore wings with dark spots in the radial and medial areas. Cerci markedly swollen at the tip, as in Fig. 124 . . . . ***E. clavigera*** sp. n. (p. 153)
– Fore wings without dark spots in the radial and medial areas. Cerci not shaped as in Fig. 124 7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Figs 116–142 *Eulioptera*. 116–130. Dorsal view of the right male cercus of (116) *E. reticulata*; (117) *E. disparidens*; (118) *E. umbilima*; (119) *E. crosskeyi*; (120) *E. flexilima* (with further enlarged posterior view of tip); (121) *E. longicerca*; (122) *E. insularis*; (123) *E. atkinsonae*; (124) *E. clavigera*; (125) *E. monticola*; (126) *E. montana*; (127) *E. incisa*; (128) *E. bilobata*; (129) *E. spinulosa*; (130) *E. breviala*. 131–142. Ventral view of the male subgenital plate of (131) *E. reticulata*; (132) *E. disparidens*; (133) *E. umbilima*; (134) *E. crosskeyi*; (135) *E. flexilima*; (136) *E. longicerca*; (137) *E. insularis*; (138) *E. atkinsonae*; (139) *E. clavigera*; (140) *E. monticola*; (141) *E. montana*; (142) *E. incisa*.

7 Subgenital plate deeply divided into two lobes, as in Figs 140 or 141. (Uplands in Kenya or Tanzania) . . . 8

– Subgenital plate not shaped as in Figs 140 or 141, much less deeply bilobed . . . 9

8 Cerci shaped as in Fig. 125. Total length more than 30 mm . . . ***E. monticola*** sp. n. (p. 154)

– Cerci shaped as in Fig. 126. Total length less than 29 mm . . . ***E. montana*** sp. n. (p. 155)

9 Hind tibiae with no dorsal apical spurs . . . ***E. atkinsonae*** (p. 153)

– Hind tibiae with a dorsal apical spur on each side . . . 10

10 Hind tibiae with 3 apical spurs on each side. Cerci shaped at the tip as in Fig. 120 . . . ***E. flexilima*** sp. n. (p. 150)

– Hind tibiae with 2 apical spurs on each side. Cerci not shaped at the tip as in Fig. 120 . . . 11

11 From West Africa, Chad or Sudan . . . 12

– From central, southern or eastern Africa . . . 14

12 Stridulatory region of the left fore wing with a large dark brown patch. Mid tibiae with more than 8 external ventral spurs . . . ***E. crosskeyi*** sp. n. (p. 149)

– Stridulatory region of the left fore wing without a large dark brown patch, though sometimes with some small dark markings. Mid tibiae with fewer than 7 external ventral spurs . . . 13

13 Cerci shaped as in Fig. 117. Stridulatory file with more than 130 teeth (excluding the small distal ones) arranged as in Fig. 158 . . . ***E. disparidens*** sp. n. (p. 148)

– Cerci shaped as in Fig. 118. Stridulatory file with fewer than 120 teeth (excluding the small distal ones) arranged as in Fig. 159 . . . ***E. umbilima*** sp. n. (p. 149)

14 Cerci extending beyond the subgenital plate, shaped as in Fig. 121. Stridulatory file with more than 145 teeth arranged as in Figs 162 or 163 . . . ***E. longicerca*** Ragge (p. 151)

– Cerci not extending beyond the subgenital plate, shaped as in Fig. 116. Stridulatory file with fewer than 145 teeth (excluding the small distal ones) arranged as in Figs 155, 156 or 157 . ***E. reticulata*** (Brunner) (p. 140)

Females

Females are so far unknown in four species and apparently indistinguishable in a further three; it would therefore be rather pointless to provide a key for the remaining eight. West African females are likely to belong to *E. disparidens, E. umbilima* or *E. crosskeyi*; I have been unable to find a reliable way of identifying them further. *E. insularis, E. atkinsonae* and *E. bilobata* are characterized by lacking dorsal apical spurs on the hind tibiae; their provenances are, respectively, Pigalu (formerly Annobón, Gulf of Guinea), eastern Botswana and southern Malawi. *E. clavigera* (Angola and Botswana) has dark spots on the fore wings and an unusually long ovipositor (about 7–8 mm) with a characteristic lip at the base of the lower valves (Fig. 152). *E. monticola* (Tanzanian highlands) and *E. montana* (Chyulu Range, Kenya) also have characteristic structures at the base of the ovipositor (Figs 153 and 154). Females from West or Central Africa with a posterior projection from the tenth abdominal tergite (Fig. 151) are likely to belong to either *E. spinulosa* or *E. breviala*, the latter species having characteristically short hind wings. The only two remaining species in which the female is known are *E. reticulata* and *E. flexilima*; the latter may be distinguished from the former by its longer mid tibiae (over 8 mm).

Eulioptera reticulata (Brunner)

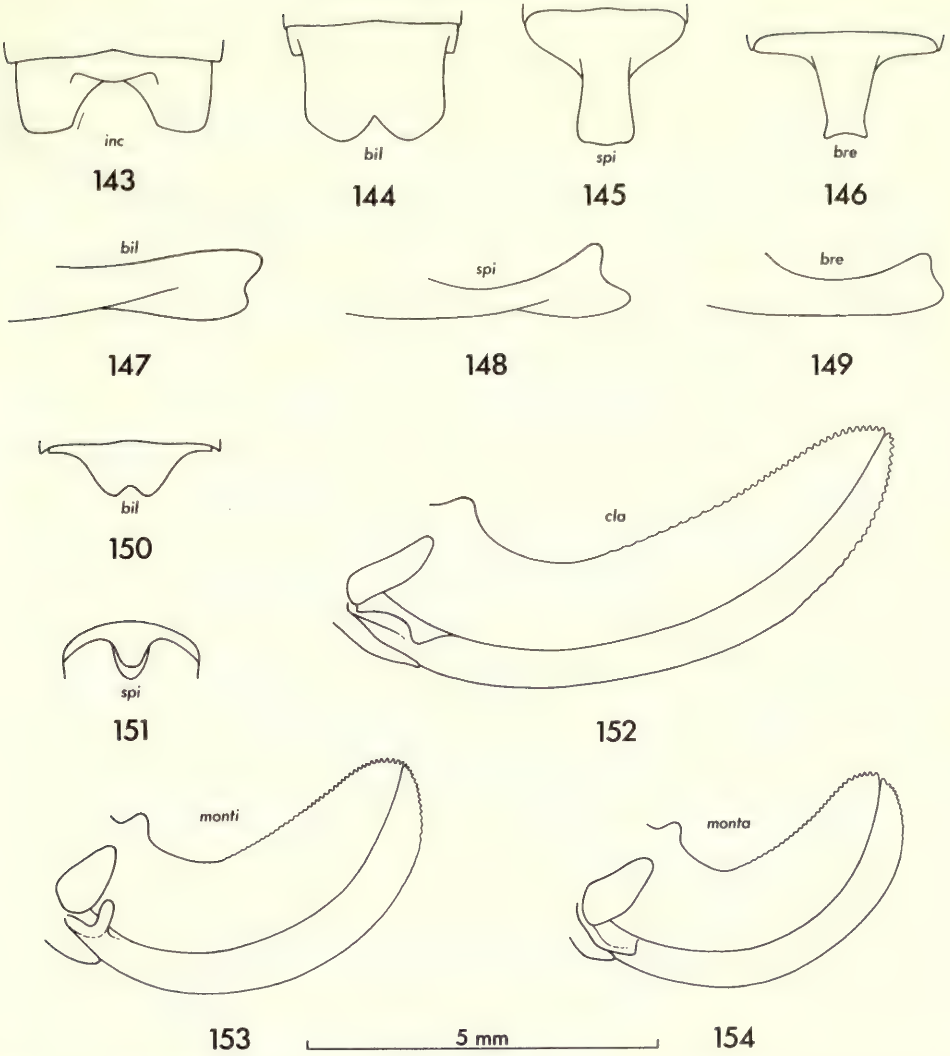
(Figs 115, 116, 131, 155–157, 174, 175)

Phaneroptera reticulata Brunner, 1878: 213.
Eulioptera reticulata (Brunner) Ragge, 1956: 268 [in a much broader sense than in the present paper].

DIAGNOSIS. ♂ ♀. Hind femora unarmed or with 1–3 ventral spinules. Stridulatory file of male with about 70–140 fairly evenly spaced teeth (excluding small distal ones) arranged as in Figs 155, 156, or 157. Tenth abdominal tergite unmodified. Male cerci shaped as in Fig. 116. Male subgenital plate shaped as in Fig. 131.

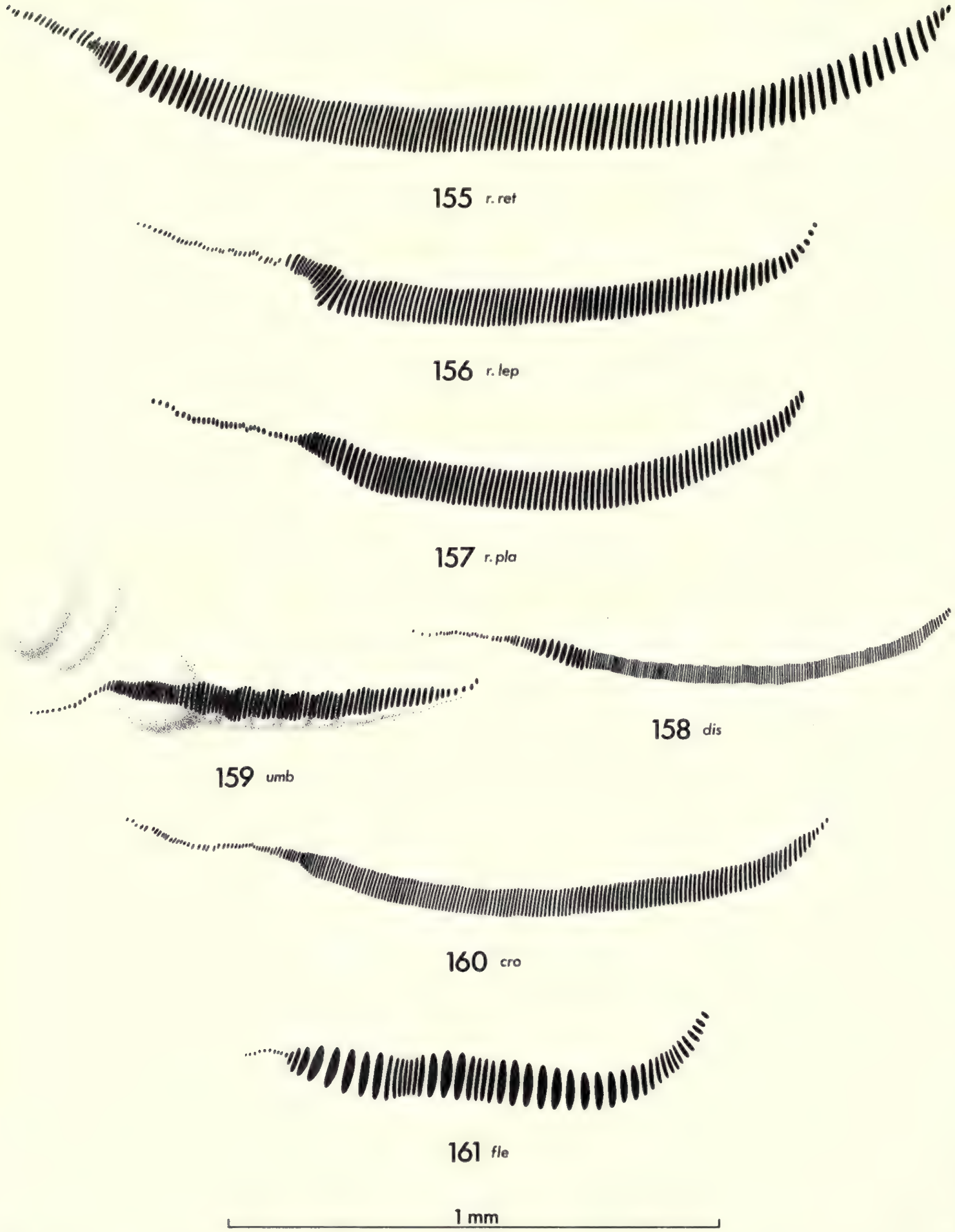
DISCUSSION. Males of this species may be distinguished from most other species of *Eulioptera* by the shape of the cerci and subgenital plate. Males of *E. umbilima* and *E. crosskeyi*, which are rather similar in these characters, are confined to West Africa, where *E. reticulata* does not occur; *E. umbilima* has a quite different stridulatory file and *E. crosskeyi* has much more numerous ventral spurs on the mid tibiae. The females are much less clearly characterized and can be recognized only by association with males or by lacking the positive diagnostic features shown by the females of several other species of the genus.

In my 1956 revision I treated this species as being composed of two subspecies, the nominate

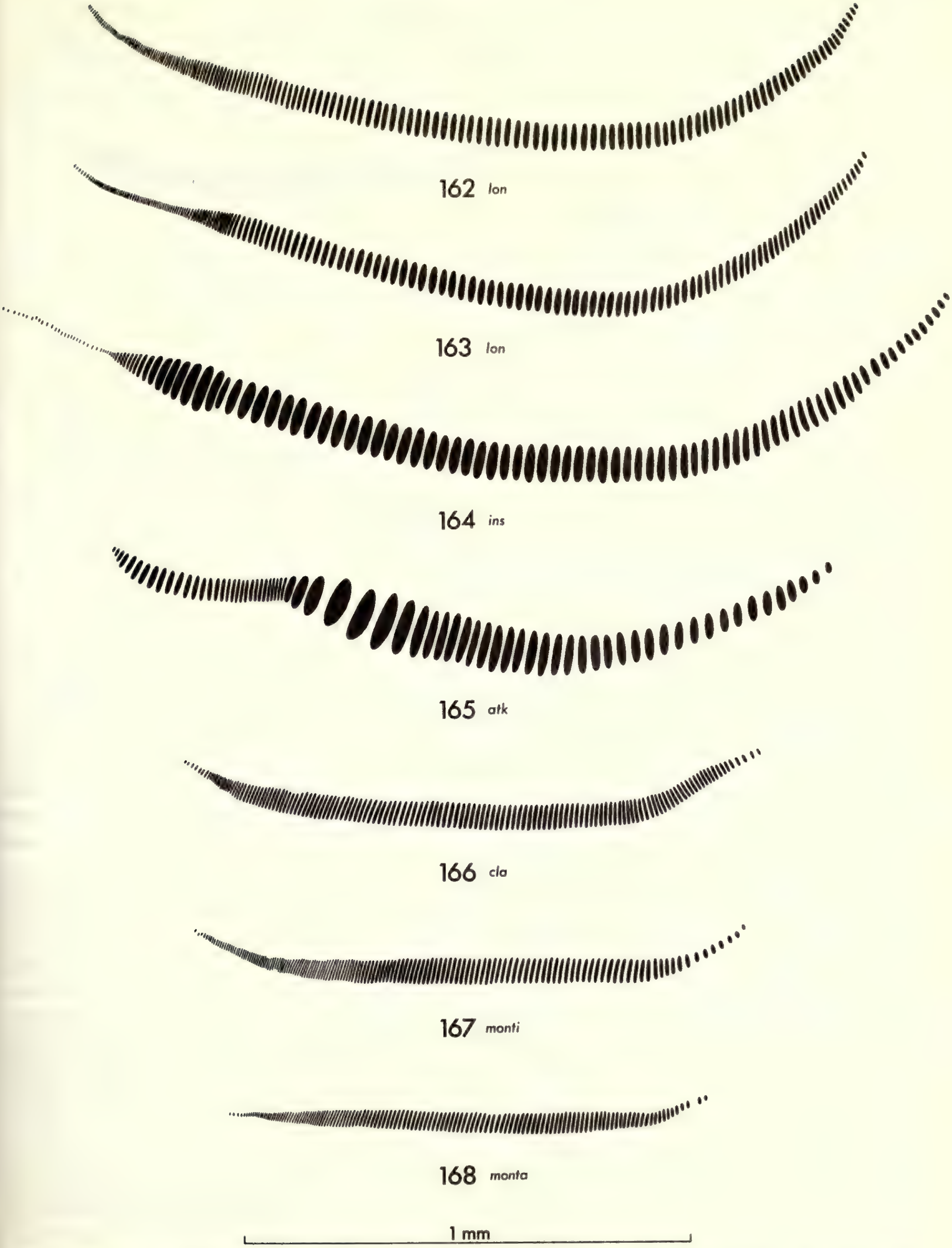


Figs 143–154 *Eulioptera*. 143–146. Dorsal view of the male tenth abdominal tergite of (143) *E. incisa*; (144) *E. bilobata*; (145) *E. spinulosa*; (146) *E. breviala*. 147–149. Lateral view of the male subgenital plate of (147) *E. bilobata*; (148) *E. spinulosa*; (149) *E. breviala*. 150, 151. Dorsal view of the female tenth abdominal tergite of (150) *E. bilobata* and (151) *E. spinulosa*. 152–154. Lateral view of the ovipositor of (152) *E. clavigera*; (153) *E. monticola*; (154) *E. montana*.

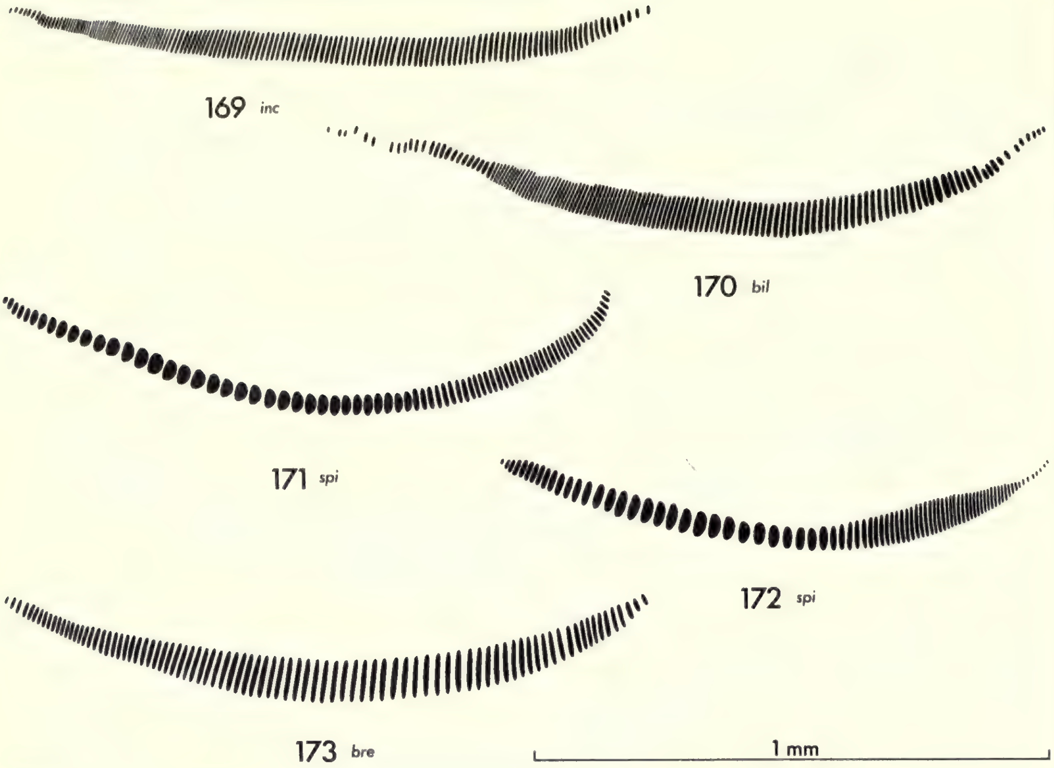
one restricted to a relatively small area of eastern South Africa and the other occurring throughout tropical Africa. As I remarked at the time, the widespread subspecies was very variable and it seemed quite possible that sibling species were involved. To test this possibility I have examined the stridulatory files of about 60 males from localities scattered over the whole of the range and have indeed found that they show striking differences. In three cases I have been able to find other supporting characters and I have no hesitation in treating these as distinct species (*disparidens*, *crosskeyi* and *flexilima*). In a fourth case (*umbilima*) the stridulatory file is so strikingly different from that of *E. reticulata* that I feel compelled to treat it as a distinct species although there are apparently no other clear-cut diagnostic characters; this species does not, however, overlap in range with *E. reticulata* (as now restricted) and so identification is not difficult if the provenance is known. The remaining two types of stridulatory file are not so strikingly different and, as they occur in two adjacent areas of eastern Africa, I am treating them


155 r. ret
156 r. lep
157 r. pla
158 dis
159 umb
160 cro
161 fle
1 mm

Figs 155–161 Diagrams of the male stridulatory file of (155) *Eulioptera reticulata reticulata*; (156) *E. r. leptomorpha*; (157) *E. r. planilima*; (158) *E. disparidens*; (159) *E. umbilima* (showing the bumps associated with the file); (160) *E. crosskeyi*; (161) *E. flexilima*.


162 lon
163 lon
164 ins
165 atk
166 cla
167 monti
168 monta
1 mm

Figs 162–168 Diagrams of the male stridulatory file of (162) *Eulioptera longicerca* (holotype from Kinshasa, Zaire); (163) *E. longicerca* (specimen from Tundavala, Angola); (164) *E. insularis*; (165) *E. atkinsonae*; (166) *E. clavigera*; (167) *E. monticola*; (168) *E. montana*.



Figs 169–173 Diagrams of the male stridulatory file of (169) *Eulioptera incisa*; (170) *E. bilobata*; (171) *E. spinulosa* (specimen from Kamponde, Zaire); (172) *E. spinulosa* (paratype from Nyangwe, Zaire); (173) *E. breviala*.

as subspecies of *E. reticulata*; one of these takes the name *E. r. leptomorpha*, which thus becomes applied to a much more geographically restricted taxon than at the time of my 1956 study, and the other takes the new name *E. r. planilima*. The nominate subspecies retains its 1956 status and is again distinguished mainly by its stridulatory file.

I have no information at present on the stridulation of this or any other species of *Eulioptera*; such information would naturally be of great interest and would probably enable the true status of these taxa to be established with much greater certainty.

In my 1956 revision I referred on p. 272 to four female specimens resembling *E. reticulata* but having much longer ovipositors (over 7 mm) and being larger in general size. I have now examined a further four specimens of the same type and am still unable to find any males to go with them. These eight specimens come from Mali (Dioura), Nigeria (Azare and Gombe), Chad (N'gouri and Bebedjia) and Cameroun (Maroua), and do not seem to be conspecific with the males of any of the West African species of *Eulioptera* known at present. However, it can be established with certainty that they represent an undescribed species only when clearly conspecific males become available.

Distribution. *E. reticulata*, as restricted here, occurs in central, east and south-east Africa, its range extending from Ethiopia in the north to the eastern part of Cape Province in the south.

Key to the subspecies of *Eulioptera reticulata*

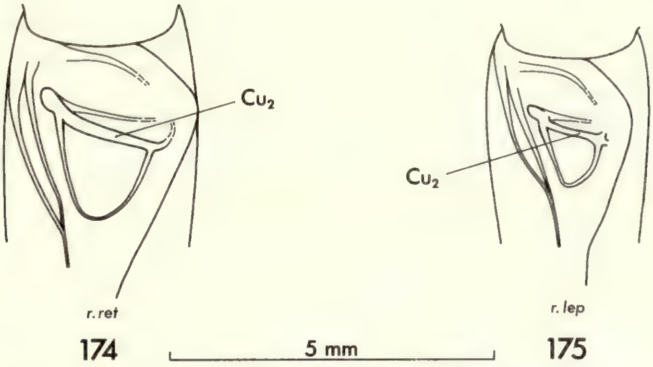
As the females of these subspecies are virtually indistinguishable, this key is based entirely on males.

1 Cu_2 of the left fore wing very prominent on the upper surface, as in Fig. 174, its raised part more than 1·8 mm in length. (South Africa and southern Mozambique) . . . . . .
E. r. reticulata (Brunner)(p. 145)

– Cu_2 of the left fore wing not particularly prominent on the upper surface, as in Fig. 175, its raised part less than 1·8 mm in length. (Mostly from north of South Africa) 2

2 Stridulatory file with a pronounced bend at the distal end (Fig. 156). (South of latitude 5°S) . **E. r. leptomorpha** Ragge (p. 146)

– Stridulatory file without a bend at the distal end (Fig. 157). (North of latitude 5°S). . . **E. r. planilima** subsp. n. (p. 147)



Figs 174, 175 Dorsal view of the male stridulatory organ of (174) *Eulioptera reticulata reticulata* and (175) *E. r. leptomorpha*.

Eulioptera reticulata reticulata (Brunner)

(Figs 115, 155, 174)

Phaneroptera reticulata Brunner, 1878: 213. Holotype ♀, SOUTH AFRICA: Cape Province, Grahamstown (NM, Vienna) [examined].
Eulioptera reticulata reticulata (Brunner) Ragge, 1956: 269.

DIAGNOSIS. ♂. Cu_2 of left fore wing very prominent on upper surface, as in Fig. 174, its raised part more than 1·8 mm in length; stridulatory file on underside about 1·7–2·0 mm in length, with about 110–140 teeth (mean of 7 examined: 125) arranged as in Fig. 155 (small distal teeth excluded from measurement and tooth count).

♀. General build rather broader than in other subspecies: width of posterior lobe of pronotal disc usually more than 2·2 mm.

MEASUREMENTS

	Males	Females
Total length	(20): 25·4–29·5, mean 27·52	(7): 26·1–29·0, mean 28·07
Median length of pronotum	(20): 3·2–3·8, mean 3·48	(8): 3·3–3·7, mean 3·48
Width of posterior lobe of pronotal disc		(8): 2·1–2·5, mean 2·36
Length of hind femur	(20): 12·6–15·7, mean 14·37	(7): 14·1–17·0, mean 15·36
Length of fore wing	(20): 15·3–19·0, mean 17·78	(8): 18·8–21·2, mean 19·62
Length of stridulatory file	(7): 1·74–1·91, mean 1·80	
Length of raised part of Cu_2 in fore wing	(20): 1·9–2·3, mean 2·10	
Length of ovipositor		(7): 4·7–5·1, mean 4·89

DISCUSSION. Males of this subspecies may be easily recognized by the broad stridulatory organ and in particular by the length of the prominently raised part of Cu_2 on the upper surface of the left fore wing. The females are not so clearly recognizable but have a rather broader general build than those of the other two subspecies of *E. reticulata*.

MATERIAL EXAMINED

Holotype ♀, **South Africa**: Cape Province, Grahamstown (*Higgins*) (NM, Vienna).

South Africa: 1 ♂, Transvaal, Pretorius Kop, 22.iii.1952 (*Janse & Vári*) (TM, Pretoria); 1 ♂, T., Crocodile Bridge, 25.iii.1952 (*Janse & Vári*) (TM, Pretoria); 1 ♀, Natal, Nqutu, 1952; 1 ♂, N., Tongaat

(*Burnup*); 1 ♂, N., Durban; 1 ♀, N., Durban, 21.vi.1957 (*Dickson*); 1 ♂, N., Durban, 1–6.iii.1960 (*van Son*); 1 ♂, N., Durban, 25.ix.1957 (*Dickson*) (TM, Pretoria); 1 ♀, N., Durban, 8.vii.1907 (*Leigh*) (TM, Pretoria); 1 ♂, N., Durban, 21.vi.1908 (*Leigh*) (ANS, Philadelphia); 3 ♂, 4 ♀, N., Durban, 8.iv–26.v.1909 (*Leigh*) (1 ♂, 1 ♀ in BMNH; rest in ANS, Philadelphia); 1 ♂, N., Durban, 7.xii.1925 (*Leigh*) (ANS, Philadelphia); 3 ♂, N., Durban, 14.vi–27.xii.1926 (*Leigh*) (1 in BMNH; 2 in ANS, Philadelphia); 3 ♂, N., Pinetown, 11–15.xii.1908 (*Leigh*) (1 in BMNH; 2 in ANS, Philadelphia); 6 ♂, N., Pinetown, 21.i–18.iii.1909 (*Leigh*) (2 in BMNH; 4 in ANS, Philadelphia); 1 ♂, N., Winkle Spirit, xii.1916 (*Akerman*); 1 ♀, N., Ndumu Game Reserve, 20–24.ii.1967 (*Gillisen & Blommers*) (ITZ, Amsterdam); 1 ♂, Cape Province, Pondoland, Port St. Johns, v.1924 (*Turner*); 1 ♂, C.P., Fort Brown (*Walton*). **Mozambique**: 1 ♂, Maputo (*Audeoud*) (MHN, Geneva).

In the BMNH unless otherwise stated.

DISTRIBUTION. This subspecies is at present known only from south of the Tropic of Capricorn, where it occurs in southern Mozambique, Transvaal, Natal and eastern Cape Province.

Eulioptera reticulata leptomorpha Ragge

(Figs 156, 175)

Eulioptera reticulata leptomorpha Ragge, 1956: 271. Holotype ♂, ZAMBIA: Mporokosa district, Mweru Wa Ntipa (BMNH) [examined].

DIAGNOSIS. ♂. Cu_2 of left fore wing not particularly prominent on upper surface, as in Fig. 175, its raised part less than 1·8 mm in length; stridulatory file on underside about 0·9–1·2 mm in length, with pronounced bend at distal end and with about 75–110 teeth (mean of 14 examined: 88) arranged as in Fig. 156 (small distal teeth excluded from measurement and tooth count).

♀. No known diagnostic characters.

MEASUREMENTS

	Males	Females
Total length	(19): 23·5–28·7, mean 26·39	(10): 28·5–31·5, mean 29·92
Median length of pronotum	(19): 3·0–3·5, mean 3·24	(10): 3·0–3·5, mean 3·32
Width of posterior lobe of pronotal disc		(11): 1·9–2·2, mean 2·12
Length of hind femur	(17): 12·3–15·1, mean 13·47	(11): 13·0–16·2, mean 14·83
Length of fore wing	(21): 14·8–18·4, mean 16·59	(10): 18·6–21·5, mean 19·90
Length of stridulatory file	(15): 0·94–1·14, mean 1·03	
Length of raised part of Cu_2 in fore wing	(20): 1·2–1·5, mean 1·34	
Length of ovipositor		(9): 4·7–5·3, mean 4·96

DISCUSSION. Males of this subspecies may be distinguished from those of *E. r. reticulata* by the shorter and less prominent Cu_2 on the upper surface of the left fore wing, and from those of *E. r. planilima* by the highly characteristic bend in the stridulatory file. The females are less robust than those of *E. r. reticulata* but seem to be indistinguishable from those of *E. r. planilima*.

MATERIAL EXAMINED

Holotype ♂, **Zambia**: Mporokosa district, Mweru Wa Ntipa, 8–13.vii.1952 (*Uvarov*) (BMNH).

Zambia: 1 ♂, 5 ♀ paratypes, same data and depository as holotype; 2 ♂, 2 ♀, 10 km E. of Lusaka, ix–xi.1956 (*King*); 1 ♂, 8–10 km E. of Lusaka, iii–vi.1956 (*King*); 4 ♂, 2 ♀, Lusaka, x–xii.1956 (*King*); 1 ♀, Lusaka, 1958 (*King*); 1 ♀, N'Changa (*Macnamara*); 1 ♂, Mbala, L. Chila, 25.viii.1949 (*FitzGerald*); 1 ♂, Chipata, Codrington House, 1962 (*Newman*); 1 ♀, near Chilangozi Game Camp, 25.vi.1962 (*Newman*); 1 ♂, Mwanya's Village, 12°43′S, 32°20′E, vii.1962 (*Newman*). **Rhodesia**: 1 ♂, Victoria Falls, 17.v.1957 (*Zimmerman*) (TM, Pretoria). **South Africa**: 1 ♂, Transvaal, Skukusa, 23.iii.1952 (*Janse & Vári*) (TM, Pretoria). **Tanzania**: 2 ♂, 1 ♀, Rukwa Valley, 31.v–8.vii.1948 (*Waloff*); 1 ♂, Milepa Plain, ii.1949 (*Burnett*). **Zaire**: 1 ♂, 1 ♀, Katanga, Biano, 8–11.viii.1931 (*Mackie*); 1 ♀, Katanga, 48 km E. of Lake Kisali, 880 m (*Springer*) (ANS, Philadelphia); 1 ♀, Katanga, Kansenia, 15.ix–15.x.1930 (*de Witte*) (MRAC, Tervuren); 1 ♀, Lubumbashi, ii.1938 (*Brédo*) (MRAC, Tervuren); 1 ♀, Pweto (L. Moero), 23.i.1938 (*Brédo*). **Angola**: 1 ♂, Ebanga, viii (*Suisse*).

In the BMNH unless otherwise stated.

DISTRIBUTION. As a result of the present study, the known range of *E. r. leptomorpha* has become restricted to Transvaal, Rhodesia, Zambia, the Rukwa region of south-western Tanzania, southern Zaire and Angola. It doubtless also occurs in Malawi and northern Mozambique.

Eulioptera reticulata planilima subsp. n.

(Fig. 157)

DIAGNOSIS. ♂. Cu_2 of left fore wing not particularly prominent on upper surface (similar to Fig. 175), its raised part less than 1·8 mm in length; stridulatory file on underside about 0·8–1·5 mm in length, with about 70–110 teeth (mean of 12 examined: 88) arranged as in Fig. 157 (small distal teeth excluded from measurement and tooth count).

♀. No known diagnostic characters.

MEASUREMENTS

	Males	Females
Total length	(13): 24·2–29·1, mean 26·74	(10): 26·9–31·2, mean 28·77
Median length of pronotum	(12): 2·9–3·6, mean 3·20	(11): 3·1–3·5, mean 3·23
Length of hind femur	(14): 12·3–15·0, mean 13·65	(11): 13·2–15·7, mean 14·62
Length of fore wing	(14): 15·6–19·0, mean 17·26	(11): 18·0–21·3, mean 19·65
Length of stridulatory file	(14): 0·82–1·46, mean 1·16	
Length of ovipositor		(9): 4·7–5·1, mean 4·93

DISCUSSION. The stridulatory file of the male lacks the characteristic distal bend shown by that of the neighbouring subspecies *E. r. leptomorpha*, but the females of these two subspecies seem to be indistinguishable. I am including in the list of material examined the females that seem certain to belong to *E. r. planilima* and the measurements given for this sex are taken from these specimens, but as they appear to lack any diagnostic characters I am excluding them from the type-series.

In addition to the material listed below I have examined male specimens from Rhodesia (Salisbury district) and Mozambique (Busi district) that have stridulatory files of the *planilima* type, but, as they come from an area quite widely separated from the remaining material, their identity is at present uncertain. I have also examined a male specimen from Arusha (Tanzania) in which the stridulatory file, although generally of the *planilima* type, has smaller and fewer (63) teeth than those of the type-series, and its identity is thus also doubtful.

MATERIAL EXAMINED

Holotype ♂, **Uganda**: Tororo district, Sukulu, 7.ix.1961 (*Burtt*) (BMNH).

Paratypes. **Uganda**: 1 ♂, Masaka, Kalisizo, open bush, short grass, 18.v.1935 (*Johnston*); 1 ♂, Kiyunga, 8.ii.1924 (*Hargreaves*); 1 ♂, N. of Butiti, 15.viii.1964 (*Jago*). **Zaire**: 1 ♂, Lake Albert, Kawa, plain bordering lake, short grass, viii.1935 (*Johnston*); 1 ♂, Chagwe province, Mulange, 1200 m, 8.v.1922 (*Dummers*) (ANS, Philadelphia); 1 ♂, Gety, upland grass, 1400 m, 29.viii.1935 (*Johnston*). **Kenya**: 2 ♂, 10 km SW. of Kakamega, Cent. Kabirondo, 1600 m, 5.viii.1934 (*Rehn*) (1 in BMNH; 1 in ANS, Philadelphia); 1 ♂, Nairobi, at light, 17.viii.1973 (*Pener*); 1 ♂, Lake Naivasha, south shore, 14.iv.1977 (*Townsend*). **Ethiopia**: 1 ♂, Sidamo-Borana province, Malghe-Wando farm, Lake Awasa, 29.iii–2.iv.1960 (*de Koster*) (ITZ, Amsterdam). **Tanzania**: 1 ♂, Ngurdoto N.P., at light, 12.ii.1966 (*Vesey-Fitzgerald*). **Rwanda**: 1 ♂, Kigali, 1500 m, vii.1911 (*Meyer*) (ANS, Philadelphia).

Material excluded from the type-series. **Uganda**: 1 ♀, Tororo, on grass, 10.xi.1965 (*Masasi*); 1 ♀, between Fort Portal and Bundebugyo, 10.vii.1964 (*Jago*); 1 ♂, Bugwere, 30.x.1933 (*Johnston*); 2 ♀, Lango, Kigaa (Agaya), short grass-bush, i.1933 (*Johnston*); 1 ♀, Karamoja, at light, 5.xi.1933 (*Johnston*); 1 ♀, Kepeka, 5.vii.1933 (*Johnston*). **Tanzania**: 1 ♀, Rabilo Hill, Malagarasi, 12.viii.1950 (*Fitzgerald*); 1 ♀, SE. of Ngurdoto Crater, 1200 m, sunny forest margins, 12.vi.1967 (*Jago*). **Zaire**: 1 ♀, Semliki Valley, Geti Falls, open bush, x.1935 (*Johnston*); 1 ♀, Lake Albert, Kawa, plains bordering lake, short grass, viii.1935 (*Johnston*); 1 ♀, Lake Albert, Kawa, plains between lake and forest, 22.viii.1935 (*Johnston*).

In the BMNH unless otherwise stated.

DISTRIBUTION. To judge from the type-series, the range of this subspecies includes north-east Zaire, Uganda, Kenya, southern Ethiopia, northern Tanzania and Rwanda.

Eulioptera disparidens sp. n.

(Figs 117, 132, 158)

DIAGNOSIS ♂. Stridulatory file with about 140–200 teeth (excluding small distal ones), small group of them at distal end of file being conspicuously larger than remaining ones (Fig. 158). Cerci shaped as in Fig. 117.
♀. No known diagnostic characters.

DESCRIPTION. ♂. Fore coxae with small to medium-sized spine. Fore and mid femora unarmed. Hind femora usually with 1–3 very small ventral spinules. Fore tibiae with 2 external ventral spurs. Mid tibiae with 2–3 external ventral spurs, apical one somewhat enlarged and flattened. Hind tibiae with about 30–50 external dorsal spines, and 2 apical spurs on each side, ventral one usually much bigger than dorsal one. *Sc* of fore wings thickened near base. Stridulatory file with about 140–200 teeth (mean of 8 examined: 167, excluding small distal teeth), small group of them at distal end of file being conspicuously larger than remaining ones (Fig. 158). Hind wings extending beyond fore wings by between third and half length of latter.

Tenth abdominal tergite unmodified. Cerci shaped as in Fig. 117. Subgenital plate shaped as in Fig. 132.

General coloration brown or green, with red-brown spots on most of body and legs. Femoral and tibial spines and spurs with dark tips. Stridulatory region of left fore wing often with few dark markings; cells along hind margin of fore wings darkened. Cerci darkened at tip.

♀. See Discussion below.

MEASUREMENTS

	Males
Total length	(13): 23·6–25·9, mean 25·01
Median length of pronotum	(13): 2·8–3·3, mean 3·15
Length of hind femur	(11): 12·3–14·0, mean 13·28
Length of fore wing	(13): 14·5–16·1, mean 15·36
Length of stridulatory file (excluding small distal teeth)	(10): 0·80–1·00, mean 0·91

DISCUSSION. Males of this species are most clearly characterized by the stridulatory teeth, which are more numerous than those of most of the other species of *Eulioptera*, and a small group of which are conspicuously larger than the others. The male cerci are also characteristically shaped and enable this sex to be recognized if necessary without examination of the stridulatory file. The females appear to lack any diagnostic characters and, although I have examined about a dozen female specimens bearing the same data as males of this species, I cannot be certain that they are conspecific with the males and am therefore excluding them from the type-series and formal description. Although *E. disparidens* seems in general to occur further south than *E. umbilima*, the two species have been collected together on the same day at one locality in northern Ghana (1 male of *E. disparidens*, 4 males of *E. umbilima* from '2 miles S. of Masaka') and so the provenance of a female cannot be relied on as an indication of its identity.

MATERIAL EXAMINED

Holotype ♂, **Nigeria**: Niger State, Diko, 14.i.1959 (*Crosskey*) (BMNH).

Paratypes. **Nigeria**: 3 ♂, same data and depository as holotype; 2 ♂, Benue State, Gboko, 27.i.1955 (*Crosskey*). **Ghana**: 1 ♂, Northern Region, 3 km S. of Masaka, 30.xii.1959 (*Jago*); 2 ♂, Northern Region, between Bimbila and Nakwayele, Dagomba, 2.i.1960 (*Jago*); 1 ♂, Northern Region, between Bimbila and Nakwayele, 2.i.1960 (*Jago*). **Guinea**: 1 ♂, Nimba, Ziéla, 20.ii.1957 (*Lamotte, Amiet & Vanderplaetsen*) (MNHN, Paris). **Sudan**: 2 ♂, Rejaf, Lado Enclave, 20.xi.1921 (*Lankester*) (ANS, Philadelphia).

In the BMNH unless otherwise stated.

DISTRIBUTION. *E. disparidens* is known from Guinea, northern Ghana, Nigeria and southern Sudan, and doubtless also occurs in the Ivory Coast, Togo, Benin Republic, Chad and the Central African Empire.

Eulioptera umbilima sp. n.

(Figs 118, 133, 159)

DIAGNOSIS. ♂. Stridulatory file with undulating surface and pronounced bump at distal end, and with about 80–100 teeth (excluding small distal ones) arranged as in Fig. 159; undersurface of left fore wing with 2 further bumps near distal end of stridulatory file (Fig. 159).

♀. No known diagnostic characters.

DESCRIPTION. ♂. Fore coxae with small to medium-sized spine. Fore and mid femora unarmed. Hind femora unarmed or with 1–2 very small ventral spinules. Fore tibiae with 1–2 external ventral spurs. Mid tibiae with 3–5 external ventral spurs of uniform size. Hind tibiae with about 30–45 external dorsal spines, and 2 apical spurs on each side, ventral one usually somewhat bigger than dorsal one. *Sc* of fore wings thickened near base. Stridulatory file with undulating surface and pronounced bump at distal end, and with about 80–100 teeth (mean of 7 examined: 94, excluding small distal ones) arranged as in Fig. 159; undersurface of left fore wing with 2 further bumps near distal end of stridulatory file (Fig. 159). Hind wings extending beyond fore wings by between third and half length of latter.

Tenth abdominal tergite unmodified. Cerci shaped as in Fig. 118. Subgenital plate shaped as in Fig. 133.

General coloration brown or green, with red-brown spots on most of body and legs. Femoral and tibial spines and spurs with dark tips. Stridulatory region of left fore wing sometimes with dark markings; cells along hind margin of fore wings darkened. Cerci darkened at tip.

♀. See Discussion below.

MEASUREMENTS

	Males
Total length	(9): 23·5–24·8, mean 24·47
Median length of pronotum	(8): 3·0–3·2, mean 3·12
Length of hind femur	(9): 11·8–14·6, mean 12·94
Length of fore wing	(9): 14·2–15·8, mean 15·16
Length of stridulatory file (excluding small distal teeth)	(7): 0·72–0·79, mean 0·75

DISCUSSION. The stridulatory region of the undersurface of the left male fore wing is highly characteristic of this species. The stridulatory file is short with an undulating surface and has a conspicuous bump at the distal end; near this bump are *two* further bumps on the undersurface of the wing, the remaining species of *Eulioptera* having only one or none at all. These characters, together with the relatively low number of stridulatory teeth and the shape of the cerci and subgenital plate, enable males of *E. umbilima* to be easily distinguished from the neighbouring West African species *E. disparidens*. The females, however, seem to have no diagnostic characters and, although I have examined about a dozen female specimens that appear to be associated with the males, I am excluding them from the type-series and formal description. (See also Discussion under *E. disparidens*.)

MATERIAL EXAMINED

Holotype ♂, **Ghana**: Northern Region, 3 km S. of Masaka, 30.xii.1959 (*Jago*) (BMNH).

Paratypes. **Ghana**: 3 ♂, same data as holotype. **Senegal**: 1 ♂, Ziguinchor, Rizières, lush vegetation, 28.viii–3.ix.1962 (*Farrow*). **Mali**: 1 ♂, Bamako. **Nigeria**: 1 ♂, Gombe, Matyoro Lakes, i.1929 (*Lloyd*); 1 ♂, Gadau, 12°N, 10°E, ii.1933 (*Buxton & Lewis*).

All in the BMNH.

DISTRIBUTION. *E. umbilima* seems in general to occur in drier savanna than *E. disparidens* and shows a clear tendency to have a more northerly distribution, extending from Senegal through Mali and northern Ghana to northern Nigeria.

Eulioptera crosskeyi sp. n.

(Figs 119, 134, 160)

DIAGNOSIS. ♂. Mid tibiae with about 10–12 external ventral spurs. Stridulatory region of left fore wing with large dark brown patch; stridulatory file with about 130–155 evenly spaced teeth (excluding small distal ones) arranged as in Fig. 160. Cerci shaped as in Fig. 119. Subgenital plate shaped as in Fig. 134.

♀. No known diagnostic characters.

DESCRIPTION. ♂. Fore coxae with small spine. Fore and mid femora unarmed. Hind femora unarmed or with 1–2 very small ventral spinules. Fore tibiae with 3–5 external ventral spurs. Mid tibiae with about 10–12 external ventral spurs. Hind tibiae with about 35–45 external dorsal spines, and 2 apical spurs on each side. *Sc* of fore wings thickened near base. Stridulatory file with about 130–155 evenly spaced teeth (mean of 5 examined: 145, excluding small distal ones) arranged as in Fig. 160. Hind wings extending beyond fore wings by between third and half length of latter.

Tenth abdominal tergite unmodified but showing tendency to be emarginate in middle. Cerci shaped as in Fig. 119. Subgenital plate shaped as in Fig. 134.

General coloration green with red-brown spots on much of body and legs. Femoral and tibial spines and spurs with dark tips. Stridulatory region of left fore wing with large dark brown patch; cells along hind margin of fore wings brown. Cerci darkened towards tip.

♀. See Discussion below.

MEASUREMENTS

	Males
Total length	(4): 26·7–28·4, mean 27·68
Median length of pronotum	(5): 3·4–3·7, mean 3·54
Length of hind femur	(5): 14·1–15·4, mean 14·84
Length of fore wing	(5): 16·6–18·0, mean 17·28
Length of stridulatory file (excluding small distal teeth)	(5): 1·11–1·14, mean 1·13

DISCUSSION. The dark brown patch on the stridulatory organ enables males of this species to be distinguished at a glance from those of the other two species known from West Africa. The large number of mid tibial spurs and the regularly spaced teeth of the stridulatory file are also characteristic.

I have examined five female specimens collected from the type-locality of *E. crosskeyi* but have not been able to establish with any certainty that they are conspecific with the males. They have fewer (4–7) mid tibial external spurs and seem to be indistinguishable from females apparently belonging to *E. disparidens* and *E. umbilima*. As with these two species, therefore, I am unable to include the female sex in the type-series or in the formal description.

MATERIAL EXAMINED

Holotype ♂, **Nigeria**: Niger State, Minna, xi.1954 (*Crosskey*) (BMNH).

Paratypes. **Nigeria**: 1 ♂, same data as holotype; 3 ♂, Niger State, Minna, at light, vii.1955 (*Crosskey*). All in the BMNH.

DISTRIBUTION. Known only from the type-locality in Niger State, Nigeria.

Eulioptera flexilima sp. n.

(Figs 120, 135, 161)

DIAGNOSIS. ♂. Mid tibiae more than 7 mm (usually more than 8 mm) in length. Stridulatory file bent fairly sharply inwards towards distal end (so that it is divided into two convex parts), with about 40–50 teeth (excluding small distal ones) arranged as in Fig. 161. Cerci shaped as in Fig. 120, markedly flattened at tip. Subgenital plate shaped as in Fig. 135.

♀. Mid tibiae more than 8 mm in length.

DESCRIPTION. ♂. Fore coxae with spine. Fore and mid femora unarmed. Hind femora unarmed or with 1–7 very small ventral spinules. Fore tibiae with 1–2 external ventral spurs. Mid tibiae with about 5–7 external ventral spurs. Hind tibiae with about 40–60 external dorsal spines, and 3 apical spurs on each side. *Sc* of fore wings not or hardly thickened near base. Stridulatory file bent fairly sharply inwards towards distal end (so that it is divided into two convex parts), with about 40–50 teeth (mean of 5 examined: 46, excluding small distal ones) arranged as in Fig. 161. Hind wings extending beyond fore wings by between quarter and third length of latter.

Tenth abdominal tergite unmodified. Cerci shaped as in Fig. 120, markedly flattened at tip. Subgenital plate shaped as in Fig. 135.

General coloration green with red-brown spots on much of body and legs. Femoral and tibial spines and spurs with darkened tips. Stridulatory region of left fore wing with brown patch; cells along hind margin of fore wings often brown. Cerci darkened at tip.

♀. As male except for wings and genitalia. Hind wings extending beyond fore wings by about fifth length of latter.

MEASUREMENTS

	Males	Females
Total length	(7): 27·1–30·7, mean 28·86	(2): 26·9–27·0, mean 26·95
Median length of pronotum	(6): 3·1–3·5, mean 3·35	(4): 3·5–3·7, mean 3·60
Length of mid tibia	(6): 7·6–8·8, mean 8·35	(4): 8·1–9·0, mean 8·55
Length of hind femur	(8): 15·3–17·1, mean 16·06	(4): 16·2–17·4, mean 16·75
Length of fore wing	(7): 18·9–21·0, mean 19·81	(4): 19·3–21·7, mean 20·55
Length of stridulatory file (excluding small distal teeth)	(5): 0·87–0·97, mean 0·92	
Length of ovipositor		(4): 4·8–5·4, mean 5·12

DISCUSSION. The highly distinctive stridulatory file provides the most reliable means of recognizing males of this species, though the more easily examined cerci are also characteristic. Both sexes can be distinguished from *E. reticulata*, which occurs in the same or neighbouring parts of Africa, by the unusually long mid tibiae.

MATERIAL EXAMINED

Holotype ♂, **South Africa**: Transvaal, Soutpansberge, Entabeni, xi.1931 (*van Son*) (TM, Pretoria).

Paratypes. **South Africa**: 1 ♂, Transvaal, De Hoek Forestry, 17–18.ix.1960 (*van Son & Vári*) (TM, Pretoria); 1 ♂, 1 ♀, T., Woodbush Village, iv.1915 (*Swierstra*) (♂ in TM, Pretoria; ♀ in BMNH); 1 ♂, T., Woodbush, 14–16.ix.1960 (*van Son & Vári*) (TM, Pretoria); 1 ♂, T., Marieps Mnt., xii.1925 (*van Son*) (BMNH); 1 ♂, T., Kowyn's Pass, Pilgrim's Rest district, 22.ii.1962 (*Vári & Leleup*) (BMNH); 1 ♀, Natal, Ingwavuma district, Gwaliweni, 7–14.iv.1961 (*van Son*) (TM, Pretoria). **Rhodesia**: 1 ♂, Glenlivet, xi.1955 (NM, Bulawayo); 1 ♂, Chirinda Forest, 29 km S. of Chipinga, 1110 m, 18.iii.1958 (*Ross & Leech*) (CAS, San Francisco); 1 ♀, near Chirinda, Gaza Land, viii.1907 (*Marshall*) (BMNH).

Material excluded from the type-series. **Mozambique**: 1 ♂, Maputo (MLZA, Lisbon); 1 ♂, 1 ♀, Busi R., xii.1906 (*Swynnerton*) (BMNH). I have excluded these specimens from the type-series because of their poor condition, but there is no doubt that they are *E. flexilima*. I have also examined two males (on loan from TM, Pretoria) labelled 'Lemana', a locality that I have been unable to trace.

DISTRIBUTION. Known only from south-eastern Rhodesia, Transvaal, Natal and Mozambique.

Eulioptera longicerca Ragge

(Figs 121, 136, 162, 163)

Eulioptera longicerca Ragge, 1956: 273. Holotype ♂, ZAIRE: Kinshasa (MRAC, Tervuren) [examined].

DIAGNOSIS. ♂. Hind femora with about 4–7 ventral spinules. Stridulatory file about 1·3–1·8 mm in length, with about 150–165 teeth (mean of 3 examined: 157) arranged as in Figs 162 or 163 (smaller distal teeth included in measurement and tooth count). Tenth abdominal tergite unmodified. Cerci extending beyond tip of subgenital plate, shaped as in Fig. 121. Subgenital plate shaped as in Fig. 136.

♀ unknown.

DISCUSSION. The stridulatory file, with its distal 'tail' of about 50–60 extremely small, dense teeth, provides the most reliable character for recognizing males of this species. The shape and relative length of the cerci, although rather variable, are also characteristic, especially when taken in conjunction with the shape of the subgenital plate. I have seen no female specimens that seem likely to belong to this species; this sex would be difficult to recognize if there are no good characters on the ovipositor or associated structures.

In addition to the three specimens listed below I have examined a male from Eala, near Mbandaka in Zaire. This specimen, on loan from the MRAC, Tervuren, was pinned through the stridulatory organ and so it was impossible to examine the stridulatory file; in other characters it agrees well with *E. longicerca*.

Measurements

	Males
Total length	(3): 26·4–29·9, mean 28·20
Median length of pronotum	(3): 3·2–3·6, mean 3·37
Length of hind femur	(3): 13·0–15·1, mean 13·83
Length of fore wing	(3): 18·6–20·0, mean 19·33
Length of stridulatory file	(3): 1·35–1·80, mean 1·62

Material examined

Holotype ♂, **Zaire**: Kinshasa ('Léopoldville'), 2.xii.1925 (*Hulstaert*) (MRAC, Tervuren).

Angola: 1 ♂, Tundavala, 13–16 km NW. of Sa da Bandeira, 27–29.iii.1972 (*BMNH Southern African Expedition*) (BMNH). **South West Africa**: 1 ♂, Kaokoveld, Anabib (Orupembe), 160 km W. of Ohopoho, 12–13.vi.1951 (*Swedish South Africa Expedition*) (MNHN, Paris).

Distribution. The known distribution of *E. longicerca* is at present confined to Zaire, Angola and the extreme north-west of South West Africa.

Eulioptera insularis sp. n.

(Figs 122, 137, 164)

Diagnosis. ♂ ♀. Hind tibiae with no dorsal apical spurs and 1 ventral apical spur on each side. Stridulatory file of male about 1·9 mm in length, with about 84 teeth arranged as in Fig. 164 (small distal teeth excluded from measurement and tooth count). Male cerci shaped as in Fig. 122. Male subgenital plate shaped as in Fig. 137. Ovipositor more than 7 mm in length.

Description. ♂. Fore coxae with spine. Fore femora with about 7–9 ventral spinules. Mid femora with about 2–5 ventral spinules. Hind femora with about 8–11 ventral spinules. Fore tibiae with 3 external ventral spurs. Mid tibiae with 8–9 external ventral spurs. Hind tibiae with about 50–53 external dorsal spines, and 1 (ventral) apical spur on each side. *Sc* of fore wings markedly thickened near base. Stridulatory file with 84 teeth (excluding small distal ones) arranged as in Fig. 164. Hind wings extending beyond fore wings by between third and quarter length of latter.

Tenth abdominal tergite unmodified. Cerci shaped as in Fig. 122. Subgenital plate shaped as in Fig. 137.

General coloration green with red-brown or dark brown spots on much of body and legs. Femoral and tibial spines and spurs with dark tips. Cells along hind margin of fore wings dark brown. Cerci darkened at tip. [Description of coloration based partly on female paratype; holotype has lost green colour.]

♀. As male except for fore wings and genitalia.

Measurements

	Male	Female
Total length	33·2	38·3
Median length of pronotum	—	4·3
Length of hind femur	17·4	18·7
Length of fore wing	23·2	26·5
Length of stridulatory file (excluding small distal teeth)	1·91	
Length of ovipositor		8·1

Discussion. *E. insularis* is unique among the West African members of the genus in having only one apical spur (the ventral one) on each side of the hind tibiae. The male may also be recognized by the very long stridulatory file with characteristically arranged teeth, and the female by the unusually long ovipositor.

In addition to the female paratype I have examined a female specimen from Luba (San Carlos), Macías Nguema (Fernando Póo), that agrees with it in all characters. In the absence of a male, however, I cannot be certain of its identity and am therefore excluding it from the type-series.

Material examined

Holotype ♂, **Pigalu** (Annobón): 9.vii–22.viii.1959 (*Cambridge University Expedition*) (BMNH).

Paratype. 1 ♀, same data and depository as holotype.

DISTRIBUTION. Known for certain only from Pigalu, but probably also occurs on at least some of the other islands in the Gulf of Guinea.

***Eulioptera atkinsonae* sp. n.**

(Figs 123, 138, 165)

DIAGNOSIS. ♂. Hind tibiae with no dorsal apical spurs and 2 ventral apical spurs on each side. Stridulatory file about 1·6 mm in length, with pronounced bump towards distal end and with about 71 teeth arranged as in Fig. 165. Cerci shaped as in Fig. 123. Subgenital plate shaped as in Fig. 138.
♀ unknown.

DESCRIPTION. ♂. Fore coxae with spine. Fore and mid femora unarmed. Hind femora with about 2–3 ventral spinules. Fore tibiae with 3–4 external ventral spurs. Mid tibiae with about 6–8 external ventral spurs. Hind tibiae with about 29–31 external dorsal spines, and 2 ventral apical spurs on each side; dorsal apical spurs lacking. *Sc* of fore wings fairly strongly thickened near base. Stridulatory file with pronounced bump towards distal end and with 71 teeth arranged as in Fig. 165. Hind wings extending beyond fore wings by about third length of latter.

Tenth abdominal tergite unmodified. Cerci shaped as in Fig. 123. Subgenital plate shaped as in Fig. 138.

General coloration green with red-brown spots on much of body and legs. Femoral and tibial spines and spurs with dark tips. Cerci darkened towards tip. [Holotype discoloured, with most of green colour lost.]
♀ unknown.

MEASUREMENTS

	Male
Total length	30·8
Median length of pronotum	4·0
Length of hind femur	13·9
Length of fore wing	21·6
Length of stridulatory file	1·60

DISCUSSION. This species shares the lack of dorsal apical spurs on the hind tibiae with *E. insularis* and *E. bilobata*, but differs from those species in having two ventral apical spurs on each side. The shape of the stridulatory file and the arrangement of its teeth are unique in the genus.

It gives me pleasure to name this species after the collector, Mrs Cynthia Atkinson, and to record my gratitude to Mr Andrew Low for kindly presenting the specimen to the BMNH.

MATERIAL EXAMINED

Holotype ♂, **Botswana**: Gaborone, x–xi.1967 (*Atkinson*) (BMNH).

DISTRIBUTION. The holotype is unique.

***Eulioptera clavigera* sp. n.**

(Figs 124, 139, 152, 166)

DIAGNOSIS. ♂ ♀. Fore wings with dark spots in radial and medial areas; stridulatory file of male with about 130–140 teeth arranged as in Fig. 166. Male cerci strongly curved and markedly swollen at tip, as in Fig. 124. Male subgenital plate shaped as in Fig. 139. Ovipositor more than 7 mm in length, shaped as in Fig. 152, with lateral lip at base of lower valves.

DESCRIPTION. ♂. Fore coxae with small spine. Fore and mid femora with about 1–7 very small ventral spinules. Hind femora with about 2–10 ventral spinules. Fore tibiae with 5 external ventral spurs. Mid tibiae with about 10–11 external ventral spurs. Hind tibiae with about 27–40 external dorsal spines, and three apical spurs on each side. *Sc* of fore wings not or hardly thickened near base. Stridulatory file with about 130–140 teeth (mean of 2 examined: 134) arranged as in Fig. 166. Hind wings extending beyond fore wings by between sixth and seventh length of latter.

Tenth abdominal tergite unmodified. Cerci strongly curved and markedly swollen at tip, as in Fig. 124. Subgenital plate shaped as in Fig. 139.

General coloration green with red-brown spots on much of body and legs. Tympanal region of fore tibiae red-brown; most of tympanum dark brown. Femoral and tibial spines and spurs with dark tips. Fore wings with dark brown spots in radial and medial areas and with cells along hind margin dark brown; stridulatory region of left fore wing with dark brown or black patch. Cerci with darkened apical point.

♀. As male except for fore wings and genitalia. Coloration of fore wings similar to male; base of fore wings with dark brown or black patch. Ovipositor shaped as in Fig. 152, with lateral lip at base of lower valves.

MEASUREMENTS

	Males	Female
Total length	(2): 33·9–34·1, mean 34·00	33·3
Median length of pronotum	(2): 3·5–3·5, mean 3·50	3·7
Length of hind femur	(2): 18·2–18·5, mean 18·35	18·8
Length of fore wing	(2): 25·5–25·7, mean 25·60	25·3
Length of stridulatory file	(2): 1·05–1·24, mean 1·14	
Length of ovipositor		7·5

DISCUSSION. The dark spots in the radial and medial areas of the fore wings provide an easy means of recognizing both sexes of this species. The male cerci and ovipositor are also highly characteristic.

MATERIAL EXAMINED

Holotype ♂, **Angola**: Bruco, 26.ii–2.iii.1972 (*BMNH Southern African Expedition*) (BMNH).

Paratypes. **Angola**: 1 ♂, Bruco, 26.ii.1972 (*BMNH Southern African Expedition*) (BMNH). **Botswana**: 1 ♀, Kuke Pan, 20° 59′ S, 22° 25′ E, at light, 14–15.iv.1972 (*BMNH Southern African Expedition*) (BMNH).

DISTRIBUTION. The only two localities known both fall within the dry thorn-bush zone extending from south-west Angola through South West Africa to Botswana.

Eulioptera monticola sp. n.

(Figs 125, 140, 153, 167)

DIAGNOSIS. ♂. Stridulatory file with about 130–155 teeth arranged as in Fig. 167. Cerci rather variable but usually similar in shape to Fig. 125. Subgenital plate deeply divided into two lobes, rounded at tip, shaped as in Fig. 140 when viewed from below.

♀. Ovipositor shaped as in Fig. 153, with lobe at base of lower valves.

DESCRIPTION. ♂. Fore coxae with small (sometimes very small) spine. Fore femora with about 7–18 small ventral spinules, sometimes giving each ventrolateral edge serrate appearance. Mid femora with about 5–9 small ventral spinules. Hind femora with about 3–9 ventral spinules. Fore tibiae with about 4–7 external ventral spurs. Mid tibiae with about 9–11 external ventral spurs. Hind tibiae with about 30–45 external dorsal spines, and 3 apical spurs on each side. *Sc* of fore wing somewhat thickened towards base. Stridulatory file with about 130–155 teeth (mean of 5 examined: 142) arranged as in Fig. 167. Hind wings extending beyond fore wings by between quarter and fifth length of latter.

Tenth abdominal tergite unmodified. Cerci rather variable but usually similar in shape to Fig. 125. Subgenital plate deeply divided into two lobes, rounded at tip, shaped as in Fig. 140 when viewed from below.

General coloration green with red-brown spots on much of body and legs. Tympanal region of fore tibiae sometimes red-brown; most of tympanum brown. Femoral and tibial spines and spurs with dark tips. Fore wings with cells along hind margin dark brown; stridulatory region of left fore wing with dark brown or black patch. Cerci darkened at tip.

♀. As male except for base of fore wings and genitalia. Fore wings with cells at base of anal area dark brown. Ovipositor shaped as in Fig. 153, with lobe at base of lower valves.

MEASUREMENTS

	Males	Females
Total length	(8): 32·7–37·6, mean 34·96	(7): 34·7–38·0, mean 35·99
Median length of pronotum	(7): 3·5–3·9, mean 3·76	(10): 3·6–4·0, mean 3·77
Length of hind femur	(8): 15·5–17·1, mean 16·41	(8): 16·6–18·1, mean 17·46
Length of fore wing	(9): 23·8–27·4, mean 25·55	(10): 24·5–27·9, mean 26·78
Length of stridulatory file	(5): 1·26–1·48, mean 1·36	
Length of ovipositor		(7): 4·6–5·1, mean 4·84

DISCUSSION. Males of this species may be easily recognized by the shape of the subgenital plate, and females by the lobe at the base of the lower valves of the ovipositor.

In addition to the type-series I have examined a female specimen (on loan from the ITZ, Amsterdam) from Malindi, Kenya, which has an ovipositor of the *monticola* type but is generally smaller (total length: 31·9 mm). As it was collected from a coastal lowland locality I think it is rather doubtful that it belongs to *E. monticola*. I have also examined a male specimen (on loan from the MNHU, Berlin) from another coastal locality, Mikindani, Tanzania; although agreeing well with *E. monticola* in most characters, this specimen has cerci that are narrower at the tip and I am excluding it from the type-series.

MATERIAL EXAMINED

Holotype ♂, **Tanzania**: Amani, 19.iv.1971 (*Bailey*) (BMNH).

Paratypes. **Tanzania**: 1 ♂, same data and depository as holotype; 1 ♂, Amani, 26.xi.1906 (*Vosseler*) (MNHU, Berlin); 1 ♂, 1 ♀, E. Usambara Mts, Amani Forest Reserve East, Sigi, 11.iv.1966 (*Jago*) (BMNH); 2 ♂, 1 ♀, Usambara, 'Nguelo' (*Rolle*) (1 ♂ in BMNH; rest in NM, Vienna); 1 ♂, Mkulumuzi, 3.ix.1905 (*Vosseler*) (MNHU, Berlin); 2 ♀, Nguru Mts, above Turiani, 6.xi.1964 (*Jago*) (BMNH); 1 ♂, 6 ♀, [Udzungwa Range,] Ukami (1 ♀ in BMNH; rest in ANS, Philadelphia).

DISTRIBUTION. The type-series comes exclusively from mountainous regions in Tanzania and it seems likely that the species is typically montane. However, the specimens mentioned in the Discussion above suggest that it may also occur as a lowland form near the Kenyan and Tanzanian coasts.

Eulioptera montana sp. n.

(Figs 126, 141, 154, 168)

DIAGNOSIS. ♂. Stridulatory file with about 125 teeth arranged as in Fig. 168. Cerci shaped as in Fig. 126. Subgenital plate deeply divided into two lobes, shaped as in Fig. 141 when viewed from below.

♀. Ovipositor shaped as in Fig. 154, with lobe at base of lower valves.

DESCRIPTION. ♂. Fore coxae with very small spine. Fore femora with about 2–5 very small ventral spinules, sometimes giving part of each ventrolateral edge serrate appearance. Mid femora with about 1–5 very small ventral spinules. Hind femora with about 1–3 ventral spinules. Fore tibiae with about 4–6 external ventral spurs. Mid tibiae with about 9–12 external ventral spurs. Hind tibiae with about 25–34 external dorsal spines, and 3 apical spurs on each side. *Sc* of fore wings thickened near base. Stridulatory file with 125 teeth arranged as in Fig. 168. Hind wings extending beyond fore wings by between quarter and fifth length of latter.

Tenth abdominal tergite unmodified. Cerci shaped as in Fig. 126. Subgenital plate deeply divided into two lobes, shaped as in Fig. 141 when viewed from below.

General coloration green with red-brown spots on much of body and legs. Tympanal region of fore tibiae red-brown; most of tympana brown. Femoral and tibial spines and spurs with dark tips. Fore wings with cells along hind margin dark brown; stridulatory region of left fore wing with brown markings.

♀. As male except for wings and genitalia. Hind wings extending beyond fore wings by about sixth length of latter. Ovipositor shaped as in Fig. 154, with lobe at base of lower valves.

MEASUREMENTS

	Male	Females
Total length	26·0	(4): 24·1–26·0, mean 25·18
Median length of pronotum	3·2	(4): 2·9–3·1, mean 3·00
Length of hind femur	14·9	(3): 14·0–15·4, mean 14·80
Length of fore wing	18·7	(4): 17·9–19·7, mean 18·88
Length of stridulatory file	1·16	
Length of ovipositor		(4): 4·6–4·7, mean 4·65

DISCUSSION. The shape of the cerci and lobes of the subgenital plate enable males of this species to be easily recognized. The females share with *E. monticola* the lobe at the base of the lower valves of the ovipositor, but the lobe is quite different in shape and *E. montana* is generally much smaller with shorter fore wings and hind femora.

MATERIAL EXAMINED

Holotype ♂, **Kenya**: Chyulu Hills, 1700 m, vi.1938 (*Coryndon Museum Expedition*) (BMNH).

Paratypes. **Kenya**: 1 ♀, same data and depository as holotype; 3 ♀, same data as holotype except vii.1938 (1 in BMNH; 2 in National Museum, Nairobi).

DISTRIBUTION. Known only from the Chyulu Range in southern Kenya, where it could conceivably be endemic.

Eulioptera incisa sp. n.

(Figs 127, 142, 143, 169)

DIAGNOSIS. ♂. Stridulatory file with about 143 teeth arranged as in Fig. 169. Tenth abdominal tergite deeply incised, as in Fig. 143. Cerci shaped as in Fig. 127. Subgenital plate shaped as in Fig. 142.

♀ unknown.

DESCRIPTION. ♂. Fore coxae with small spine. [Right fore leg missing.] Left fore femur with 6 small ventral spinules. Mid femora with about 5–7 small ventral spinules. Hind femora with about 7–8 ventral spinules. Left fore tibia with 6 external ventral spurs. Mid tibiae with 12–13 external ventral spurs. Hind tibiae with about 41–45 external dorsal spines, and 3 apical spurs on each side. *Sc* of fore wings thickened near base. Stridulatory file with 143 teeth arranged as in Fig. 169. Hind wings extending beyond fore wings by about fifth length of latter.

Tenth abdominal tergite deeply incised, as in Fig. 143. Cerci shaped as in Fig. 127. Subgenital plate deeply divided into two lobes, shaped as in Fig. 142.

General coloration green with red-brown spots on much of body and legs. Tympana mostly dark brown. Femoral and tibial spines and spurs with darkened tips. Fore wings with cells along hind margin dark brown; stridulatory region of left fore wing with brown markings. [Holotype rather discoloured so that much of green colour is lost.]

♀ unknown.

MEASUREMENTS

	Male
Total length	34·9
Median length of pronotum	3·2
Length of hind femur	16·9
Length of fore wing	27·0
Length of stridulatory file	1·27

DISCUSSION. The male of this species may be easily recognized by the deeply incised tenth abdominal tergite.

MATERIAL EXAMINED

Holotype ♂, **Togo**: Anécho (MNHU, Berlin).

DISTRIBUTION. The holotype is unique.

Eulioptera bilobata sp. n.

(Figs 128, 144, 147, 150, 170)

DIAGNOSIS. ♂ ♀. Hind tibiae with no dorsal apical spurs and 1 ventral apical spur on each side. Stridulatory file of male with about 136 teeth arranged as in Fig. 170. Tenth abdominal tergite with bilobed median posterior projection shaped as in Figs 144 and 150. Male cerci shaped as in Fig. 128. Male subgenital plate shaped as in Fig. 147. Ovipositor with small lateral lobe at base of lower valves.

DESCRIPTION. ♂. Fore coxae with small spine. Fore femora with about 2–6 ventral spinules. Mid femora with about 1–4 small ventral spinules. Hind femora with about 2–11 ventral spinules. Fore tibiae with 3–4 external ventral spurs. Mid tibiae with 7–8 external ventral spurs. Hind tibiae with about 20–22 external dorsal spines and 1 (ventral) apical spur on each side. *Sc* of fore wings somewhat thickened near base. Stridulatory file with about 136 teeth arranged as in Fig. 170. Hind wings extending beyond fore wings by about quarter length of latter.

Tenth abdominal tergite with large bilobed median posterior projection shaped as in Fig. 144. Cerci shaped as in Fig. 128. Subgenital plate shaped as in Fig. 147.

General coloration green with red-brown spots on much of body and legs. Tympanal region of fore tibiae red-brown with black dorsal stripe; tympana mostly dark brown. Femoral and tibial spines and spurs with darkened tip. Stridulatory region of left fore wing reddish with black markings; cells along posterior margin of fore wing dark brown or black. Cerci darkened at tip.

♀. As male except for fore wings and genitalia. Cells along posterior margin of fore wing dark brown or black. Tenth abdominal tergite with bilobed posterior projection shaped as in Fig. 150. Ovipositor with small lateral lobe at base of lower valves.

MEASUREMENTS

	Males	Females
Total length	(3): 33·4–36·0, mean 34·70	(5): 33·7–37·4, mean 35·24
Median length of pronotum	(4): 3·6–3·9, mean 3·75	(5): 3·4–3·8, mean 3·64
Length of hind femur	(4): 14·0–15·3, mean 14·72	(4): 14·9–16·9, mean 15·65
Length of fore wing	(4): 24·6–25·8, mean 25·20	(5): 25·1–28·0, mean 25·92
Length of stridulatory file	1·31	
Length of ovipositor		(5): 5·3–5·6, mean 5·36

DISCUSSION. *E. bilobata* is unique among the East African members of the genus in having only one apical spur on each side of the hind tibiae. Both sexes may also be easily recognized by the shape of the bilobed posterior projection from the tenth abdominal tergite.

In addition to the type-series I have examined two males and a female from the Usambara Mountains in north-eastern Tanzania that also lack dorsal apical spurs on the hind tibiae and are remarkably similar to *E. bilobata*. The male cerci and subgenital plate are of the *bilobata* type and the tenth abdominal tergite is produced posteriorly in both sexes in much the same way as in *E. bilobata*; this posterior process is, however, rather different in shape in the male. The stridulatory file is shorter but has more numerous teeth, which are exceptionally dense (equivalent to about 270 per mm) towards the distal end of the file. These specimens probably represent a distinct species, but I prefer to wait until more material is available before describing it.

MATERIAL EXAMINED

Holotype ♂, **Malawi**: Limbe, Bvumbwe, on *Macadamia*, 16.ii.1978 (BMNH).

Paratypes. **Malawi**: 1 ♀, same data as holotype; 1 ♂, 2 ♀, Limbe, Bvumbwe, on *Macadamia*, 26–27.iv.1978; 1 ♂, 1 ♀, Limbe, Bvumbwe, on *Macadamia*, 2.xi.1978; 1 ♂, 1 ♀, Limbe, Bvumbwe, on *Macadamia*, 23.xi.1978.

All in the BMNH.

DISTRIBUTION. Known only from the type-locality in southern Malawi.

***Eulioptera spinulosa* Ragge**

(Figs 129, 145, 148, 151, 171, 172)

Eulioptera spinulosa Ragge, 1956: 274. Holotype ♂, ZAIRE: Kasenyi (BMNH) [examined].

DIAGNOSIS. ♂. Hind femora with about 2–7 ventral spinules. Stridulatory file about 1·0–1·4 mm in length, with about 70–90 teeth (mean of 7 examined: 80) arranged as in Figs 171 or 172. Tenth abdominal tergite with large median projection of variable form, usually similar to Fig. 145. Cerci sharply pointed, as in Fig. 129. Subgenital plate robust, of variable length and shape but usually similar to Fig. 148.

♀. Hind femora with about 2–7 ventral spinules. Tenth abdominal tergite with median posterior projection, as in Fig. 151.

MEASUREMENTS

	Males	Females
Total length	(6): 26·9–30·5, mean 28·1	(7): 29·6–31·0, mean 30·29
Median length of pronotum	(7): 3·4–3·7, mean 3·47	(5): 3·4–3·7, mean 3·50
Length of hind femur	(8): 13·7–15·6, mean 14·69	(6): 15·4–16·6, mean 16·12
Length of fore wing	(8): 16·9–19·9, mean 17·85	(8): 19·7–21·4, mean 20·41
Length of stridulatory file	(7): 1·07–1·33, mean 1·21	
Length of ovipositor		(8): 5·0–5·2, mean 5·14

DISCUSSION. The stridulatory file of the male of this species is highly characteristic, its dense proximal teeth contrasting with the much more widely spaced teeth along its more distal part. The projection from the tenth abdominal tergite also distinguishes *E. spinulosa* from all the other named species of the genus except *E. breviala* (which has much shorter hind wings) and the unnamed species mentioned below.

In my 1956 account of this species I referred to two doubtful specimens, a male from Salisbury, Rhodesia, and a female (with the abdomen and most of the legs missing) from Barberton, Transvaal. I have now examined the stridulatory file of the male and this shows that it is not *E. spinulosa* but represents another undescribed species of the genus; I prefer, however, not to describe it until more material becomes available. The female without an abdomen I now think unlikely to be *E. spinulosa*; it could conceivably be *E. reticulata* or *E. flexilima*. The female from Ghana listed in my 1956 revision is also of doubtful identity; it is quite possibly not *E. spinulosa*, although it has more (4) ventral spinules on its one remaining hind femur than is normal in the West African species *E. disparidens*, *E. umbilima* and *E. crosskeyi*.

I have also now examined three further male specimens with genitalia of the *spinulosa* type but with stridulatory files that are quite different; two of these specimens, from Angola, clearly represent another unnamed species and the third, from Uganda, probably belongs to yet another. It is again preferable to wait until more material is available before describing these species.

MATERIAL EXAMINED (in addition to material listed in my 1956 revision)

Chad: 1 ♂, Sarh ('Fort Archambault'), 7.iii.1948 (*Carpenter*) (ANS, Philadelphia). **Central African Empire**: 1 ♀, Bangui, Fatima, indoors, 19.xii.1968 (*Usher*) (BMNH). **Zaire**: 1 ♂, 1 ♀, Faradje, 29°40′E, 30°40′N, 19.xii.1912–15.i.1913 (*Lang & Chapin*) (AMNH, New York). **Uganda**: 1 ♂, Bukalasa, 22.i.1921 (*Lankaster*) (ANS, Philadelphia). **Angola**: 1 ♂, NE. Lunda, Sombo, 12.vii.1957 (BMNH).

DISTRIBUTION. It follows from the discussion above and list of further material examined that *E. spinulosa* is known for certain only from southern Chad, Zaire, Uganda and northern Angola. There are also records based only on females from Congo (Ragge, 1956: 276) and the Central African Empire.

Eulioptera breviala Ragge

(Figs 130, 146, 149, 173)

Eulioptera breviala Ragge, 1956: 277. Holotype ♂, ZAIRE: Kivu, Kibumba (MRAC, Tervuren) [examined].

DIAGNOSIS. ♂. Hind femora with about 2–8 ventral spinules. Dorsal spines of hind tibiae large and widely spaced, usually fewer than 20 in number. Stridulatory file about 1·2–1·4 mm in length, with about 80–100 teeth (mean of 3 examined: 94) arranged as in Fig. 173. Hind wings extending not more than 20 mm from hind margin of pronotal disc, usually projecting beyond fore wings by less than sixth length of latter. Tenth abdominal tergite with large median posterior projection shaped as in Fig. 146. Cerci sharply pointed, as in Fig. 130. Subgenital plate robust, shaped as in Fig. 149.

♀. Hind femora with about 2–8 ventral spinules. Dorsal spines of hind tibiae large and widely spaced, usually fewer than 20 in number. Hind wings extending not more than 21 mm from hind margin of pronotal disc, usually projecting beyond fore wings by less than sixth length of latter. Tenth abdominal tergite with median posterior projection (similar to Fig. 151).

MEASUREMENTS

	Males	Females
Total length	(2): 19·1–20·6, mean 19·85	(4): 21·0–25·8, mean 23·45
Median length of pronotum	(5): 3·4–3·6, mean 3·52	(7): 3·2–4·0, mean 3·56
Length of hind femur	(4): 12·5–13·5, mean 13·08	(8): 12·6–16·4, mean 14·02
Length of fore wing	(4): 13·2–14·9, mean 14·15	(8): 13·5–19·0, mean 15·58
Length of stridulatory file	(3): 1·24–1·34, mean 1·27	
Length of exposed part of hind wing	(2): 1·8–2·0, mean 1·90	(4): 1·8–2·2, mean 2·05
Length of ovipositor		(7): 4·6–5·5, mean 5·00

DISCUSSION. The relatively short hind wings and the large, rather sparsely distributed dorsal spines on the hind tibiae distinguish both sexes of this species from all the other members of the genus.

MATERIAL EXAMINED (in addition to material listed in my 1956 revision)

Zaire: 1 ♀, Virunga National Park, Ruwenzori, Kalonge, R. Katauleko, confluence with Butahu, 2180 m, 28–29.vii.1952 (*Vanschuytbroeck & Kekenbosch*) (BMNH); 2 ♂, 3 ♀, Kivu, Mulungu, 1939 (*Hendrickx*) (1 ♂, 1 ♀ in BMNH; rest in MRAC, Tervuren). **Burundi**: 1 ♀, Muyeha, R. Kishubi, 1700 m, 13.vii.1952 (*Laurent*) (MRAC, Tervuren). **Uganda**: 1 ♀, 2 km E. of Bundebugyo, 9.viii.1964 (*Jago*) (BMNH); 1 ♀, Kibale Forest Reserve, SE. of Fort Portal, 13.viii.1964 (*Jago*) (BMNH).

DISTRIBUTION. The additional material listed above confirms my suggestion (Ragge, 1956: 278) that this species may be confined to the highlands flanking the rift-valley running between Lake Albert and Lake Tanganyika.

MELIDIA Stål

(Fig. 176)

Melidia Stål, 1876: 60. Type-species: *Melidia brunneri* Stål, by monotypy.

♂ ♀. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above, markedly concave in profile. Eyes oval, prominent. Pronotum without lateral carinae, surface smooth and matt. Fore coxae with spine. Fore and mid femora with ventral spinules or unarmed. Hind femora almost always with one or more ventral spinules near apex. Fore tibiae with open tympanum on each side. Fore and mid tibiae without dorsal spurs except, usually, at apex. Hind tibiae with three apical spurs on each side. Both pairs of wings fully developed. Fore wings matt and opaque or (in male of *M. laminata*) somewhat translucent and shiny, especially in anterior part; *Sc* and *R* separate from base, though sometimes quite closely approximated along part of their length. Male tenth abdominal tergite enlarged and sometimes produced posteriorly somewhat. Male subgenital plate without styles. Ovipositor well developed, with fine teeth.

DISCUSSION. This genus has no striking features although the fastigium of the vertex, which is prominently raised in the region of the lateral ocelli (thus giving it a markedly concave profile), is fairly characteristic. It differs from *Ducetia* in having a well developed fore coxal spine and from *Phaneroptera* in being more robustly built, with relatively broader fore wings. In the males the stridulatory region of the left fore wing is brown or conspicuously marked with brown, thus contrasting with the general green colouring.

DISTRIBUTION. *Melidia* occurs primarily in eastern, central and southern Africa (including Botswana and South West Africa), but there is a male specimen of *M. brunneri* in the BMNH from Lokoja, Nigeria.

INCLUDED SPECIES. *M. brunneri* Stål, *M. kenyensis* Chopard, *M. laminata* Chopard.

PARAPYRRHICIA Brunner

Parapyrrhicia Brunner, 1891: 149. Type-species: *Parapyrrhicia zanzibarica* Brunner, by monotypy.

♂ ♀. Head sometimes with frontogenal carinae. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above, concave in profile. Eyes almost circular, prominent. Pronotum without lateral carinae, surface smooth and matt. Fore coxae with spine. Femora with ventral spinules (but see Discussion below). Fore tibiae with open tympanum on each side. Fore and mid tibiae with dorsal spurs. Hind tibiae with three apical spurs on each side. Both pairs of wings fully developed. Fore wings shiny and translucent; *Sc* and *R* slightly separated at base, then becoming contiguous for most of their length before diverging apically. Tenth abdominal tergite more or less enlarged. Male subgenital plate without styles. Ovipositor well developed, with coarse marginal teeth and with denticulate surface in apical half.

DISCUSSION. This genus was described on the basis of a single female from 'Zanzibar', and this specimen is now lost. I have examined ten specimens that I believe to belong to *Parapyrrhicia*, although all ten of them differ from the original description in one respect: they have ventral spinules on the fore and mid femora (usually quite numerous but one female has only two on the right fore and mid femora). If Brunner's female was correctly described in this respect it might

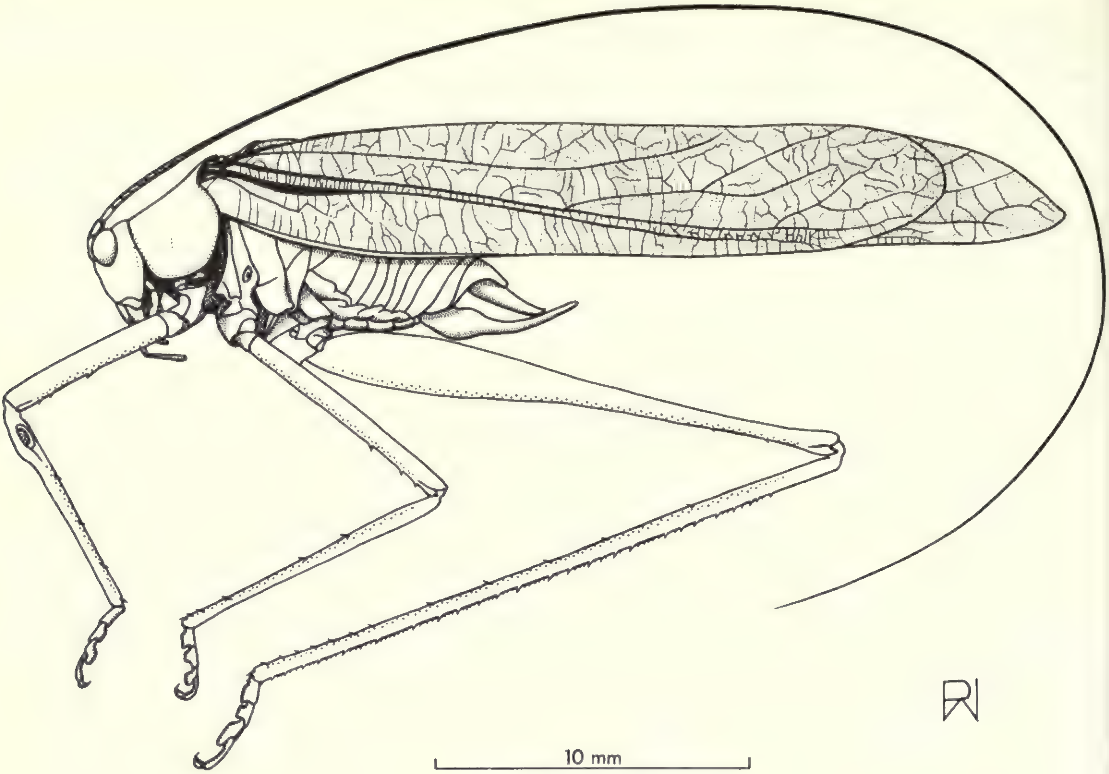


Fig. 176 *Melidia brunneri*, male.

have been an unusual one or, much less likely, it might not have been conspecific with any of the specimens I have examined. These specimens agree closely with the original description and illustration in all other characters. The two Madagascan species that have been assigned to *Parapyrrhicia*, *P. dentipes* Saussure and *P. virilis* Carl, both have ventral spinules on the fore and mid femora.

Parapyrrhicia shows some affinity with *Eulioptera* and *Pleothrix*, but differs from both these genera in having at least one non-apical dorsal spur on the fore and mid tibiae. The female cerci in the two species examined are unusually short and end rather abruptly, giving them a 'docked' appearance. The genitalia of the only known male specimen are quite extraordinary (see p. 162).

DISTRIBUTION. Known only from Madagascar and East Africa, where it occurs in the extreme south of Kenya and in the eastern and southern part of Tanzania.

Key to the African species of *Parapyrrhicia*

This key is for females only as the male sex is still unknown in *P. zanzibarica*.

1 Subgenital plate truncate, without posterolateral processes (Fig. 179) ***P. zanzibarica*** Brunner (p. 160)
– Subgenital plate with acute posterolateral processes (Fig. 180) . . . ***P. acutilobata*** sp. n. (p. 161)

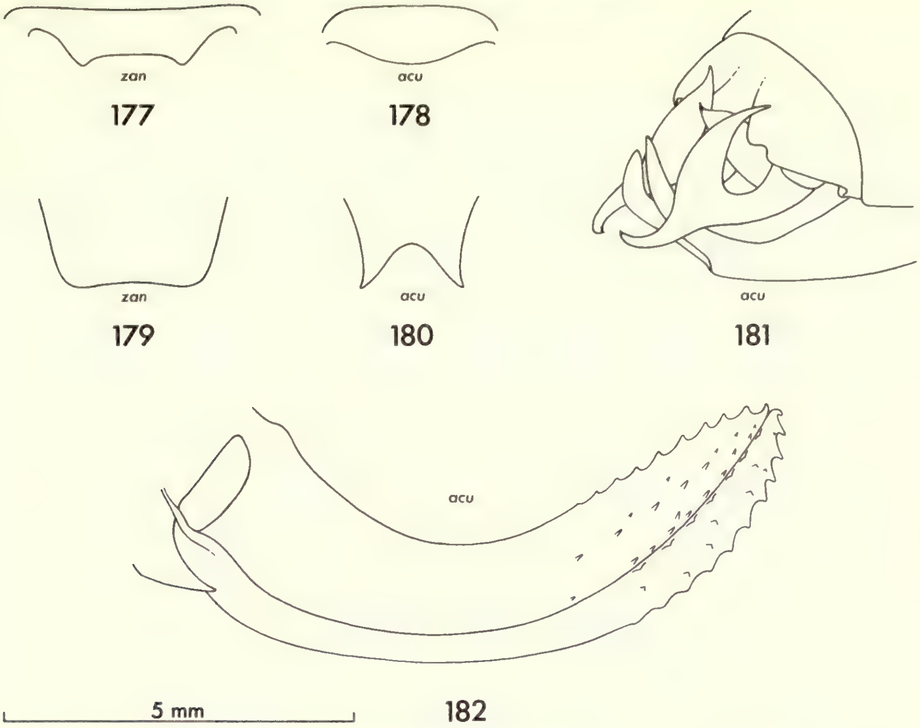
Parapyrrhicia zanzibarica Brunner

(Figs 177, 179)

Parapyrrhicia zanzibarica Brunner, 1891: 149. Holotype ♀, 'ZANZIBAR' (lost).

DIAGNOSIS. ♂ unknown.

♀. Tenth abdominal tergite shaped as in Fig. 177. Subgenital plate truncate, as in Fig. 179.



Figs 177–182 *Parapyrrhicia*. 177, 178. Dorsal view of the female tenth abdominal tergite of (177) *P. zanzibarica* and (178) *P. acutilobata*. 179, 180. Ventral view of the female subgenital plate of (179) *P. zanzibarica* and (180) *P. acutilobata*. 181. The male genitalia of *P. acutilobata*, viewed dorsolaterally and slightly from behind. 182. Lateral view of the ovipositor of *P. acutilobata*.

Measurements

	Females
Total length	(6): 37·4–47·8, mean 42·15
Median length of pronotum	(6): 4·7–6·2, mean 5·27
Length of hind femur	(6): 20·0–24·3, mean 22·02
Length of fore wing	(6): 30·5–36·7, mean 32·92
Length of ovipositor	(6): 7·7–10·4, mean 8·97

Discussion. Females of this species may be easily distinguished from those of *P. acutilobata* by the truncate subgenital plate and the shape of the tenth abdominal tergite.

Material examined

Tanzania: 1 ♀, E. Usambara Mts, Sigi, 18–31.xii.1965 (*Jago*); 1 ♀, E. Usambara Mts, Kizugi, Amani, 18–31.xii.1965 (*Jago*); 1 ♀, E. Usambara Mts, near Amani, Sigi, 4.iv.1966 (*Jago*); 1 ♀, Mhonda, 100 km SW. of Handeni, 400 m, 13.xi.1957 (*Ross & Leech*) (CAS, San Francisco); 1 ♀, Lake Nyasa, Langenburg, 1–26.vii.1898 (*Fülleborn*) (MNHU, Berlin). 1 ♀ without data (MNHU, Berlin).

In the BMNH unless otherwise stated.

Distribution. Known only from eastern and southern Tanzania.

Parapyrrhicia acutilobata sp. n.

(Figs 178, 180–182)

Diagnosis. ♂. Cerci shaped as in Fig. 181, with large dorsal, thorn-like spike. Subgenital plate deeply divided into two lobes, as in Fig. 181.

♀. Tenth abdominal tergite shaped as in Fig. 178. Subgenital plate with acute posterolateral processes, as in Fig. 180.

DESCRIPTION. ♂. Fore femora with about 7–9 ventral spinules, all internal. Mid femora with about 8–10 ventral spinules, all external. Hind femora with about 9–12 ventral spinules, mostly external. Fore tibiae with about 4–7 external ventral spurs. Hind tibiae with about 25–30 external dorsal spines.

Tenth abdominal tergite emarginate and depressed medially. Cerci shaped as in Fig. 181, with large dorsal, thorn-like spike. Subgenital plate deeply divided into two lobes, as in Fig. 181.

General coloration green with red-brown spots on parts of body and legs. Femoral and tibial spines and spurs with dark tips. Tarsi with dark markings. Central part of stridulatory area of left fore wing creamy white, contrasting with dark markings in surrounding area; cells along hind margin of fore wings dark brown or black.

♀. As male except for fore wings and genitalia. Base of *M* of fore wings pale-coloured with dark spot on proximal side and often darkened cells on distal side. Tenth abdominal tergite shaped as in Fig. 178. Ovipositor shaped as in Fig. 182. Subgenital plate with acute posterolateral processes, as in Fig. 180.

MEASUREMENTS

	Male	Females
Total length	34·8	(3): 36·0–40·0, mean 38·67
Median length of pronotum	4·6	(3): 4·8–5·1, mean 4·90
Length of hind femur	17·3	(3): 19·6–20·2, mean 19·87
Length of fore wing	26·9	(3): 28·5–31·0, mean 29·97
Length of ovipositor		(3): 8·4–9·0, mean 8·70

DISCUSSION. Females of *P. acutilobata* may be distinguished from those of *P. zanzibarica* by the shape of the tenth abdominal tergite and subgenital plate. The male that I have associated with the three females of the type-series has highly characteristic cerci and also a large median sclerotized phallic process, projecting beyond the emargination of the tenth abdominal tergite and sharply pointed at the tip. It would be interesting to know whether all *Parapyrrhicia* males have such a structure, which I have not seen in any other African Phaneropterinae. This male could belong to either *P. zanzibarica* or *P. acutilobata*, but its coastal provenance and relatively small size make it more likely to belong to the present species. Because of this uncertainty I have chosen a female as holotype.

MATERIAL EXAMINED

Holotype ♀, **Tanzania**: Mikindani (*Schulz*) (MNHU, Berlin).

Paratypes. **Tanzania**: 1 ♂, Dar-es-Salaam, University College, to light, 29.iv.1966 (*Jago*) (BMNH). **Kenya**: 2 ♀, Rabai, vi.1928 (*van Someren*) (BMNH).

DISTRIBUTION. The four specimens examined all come from near the coast of southern Kenya or Tanzania.

PLEOTHRIX gen. n.

(Fig. 183)

Type-species: *Pyrrhicia conradti* Bolívar.

♂♀. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above, markedly concave in profile. Eyes circular, very prominent. Pronotum without lateral carinae, surface smooth and matt. Fore coxae with small spine. Femora with ventral spinules or unarmed. Fore tibiae with open tympanum on each side. Fore and mid tibiae without dorsal spurs. Hind tibiae with two or three apical spurs on each side. Both pairs of wings fully developed. Fore wings slightly shiny and somewhat translucent; *Sc* and *R* very slightly separated near base, then becoming contiguous for part of their length before diverging apically. Male tenth abdominal tergite somewhat enlarged. Male subgenital plate without styles. Ovipositor well developed, with fine crenulation and with small lobe at base of ventral valves.

DISCUSSION. In addition to the characters listed above, the only known species of this genus has some highly diagnostic features that may not all prove to be generic: the pronotum, frons and, especially, legs are covered with very long hairs and the hind tibiae are compressed, dorsally terete in at least the basal half and bear an unusually small number of dorsal spines (only 5–9

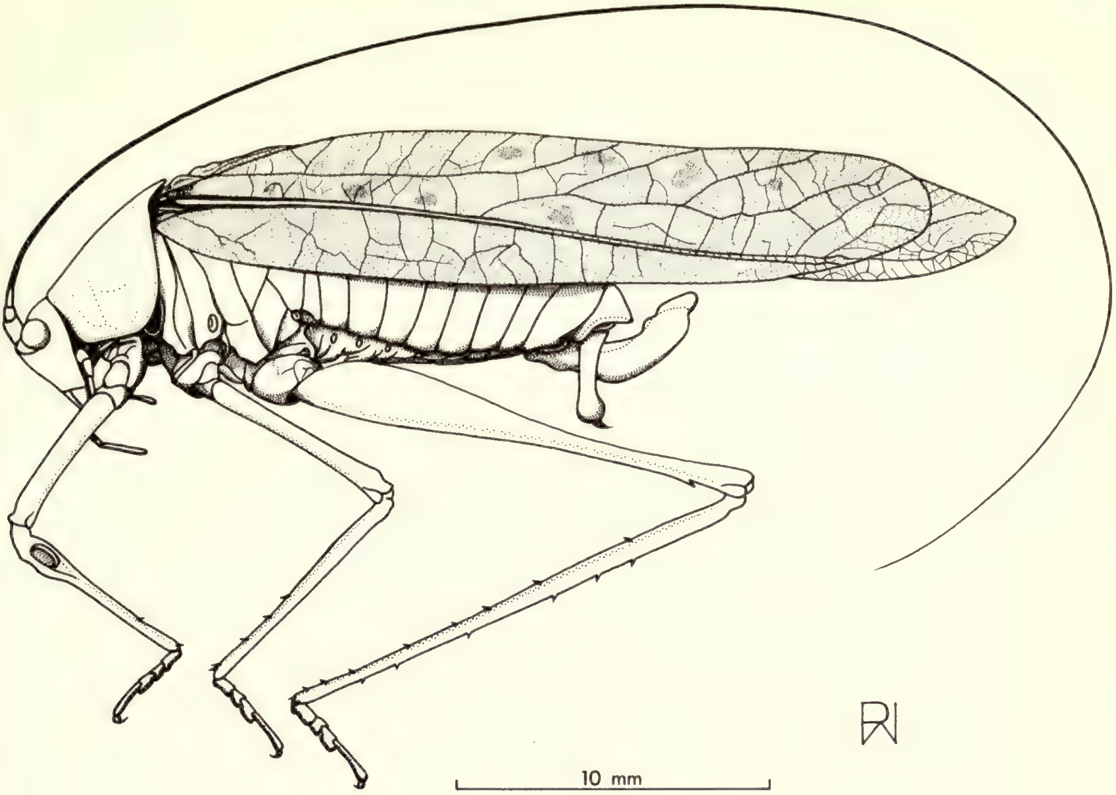


Fig. 183 *Pleothrix conradti*, male.

external ones in the four specimens examined). In these characters and in the shape of the vertex and pronotum *Pleothrix* is clearly separated from *Letana*, to which genus *P. conradti* has previously been assigned. The only other African species so far assigned to the otherwise Oriental genus *Letana* is *Pyrrhizia zanzibarica* Brunner, which I am provisionally transferring to *Eulioptera* (see p. 138). *Letana* is thus left without representation in Africa.

Pleothrix is similar in many respects to *Parapyrrhicia*, but may be distinguished from it by the shape of the fastigium of the vertex and the much shorter legs. The vertex, which is raised up in the region of the lateral ocelli, is rather similar to that of *Melidia*, but the two genera differ in several other characters, including the shape of the pronotum.

The previously unknown female of *P. conradti* has a fairly sharply pointed ovipositor about 8 mm in length.

Distribution. The four specimens I have examined (two males, including the holotype, and two females) all come from Cameroun.

Included species. *P. conradti* (Bolívar) **comb. n.**

DITHELA Karsch

(Fig. 184)

Dithela Karsch, 1890: 354. Type-species: *Dithela rectiloba* Karsch, by monotypy.

♂ ♀. Fastigium of vertex somewhat compressed, narrower than first antennal segment, usually projecting forwards beyond fastigium of frons, sulcate above. Eyes circular, prominent. Pronotum without lateral carinae but with small dorsolateral tubercle on each side, surface smooth and matt. Fore coxae without

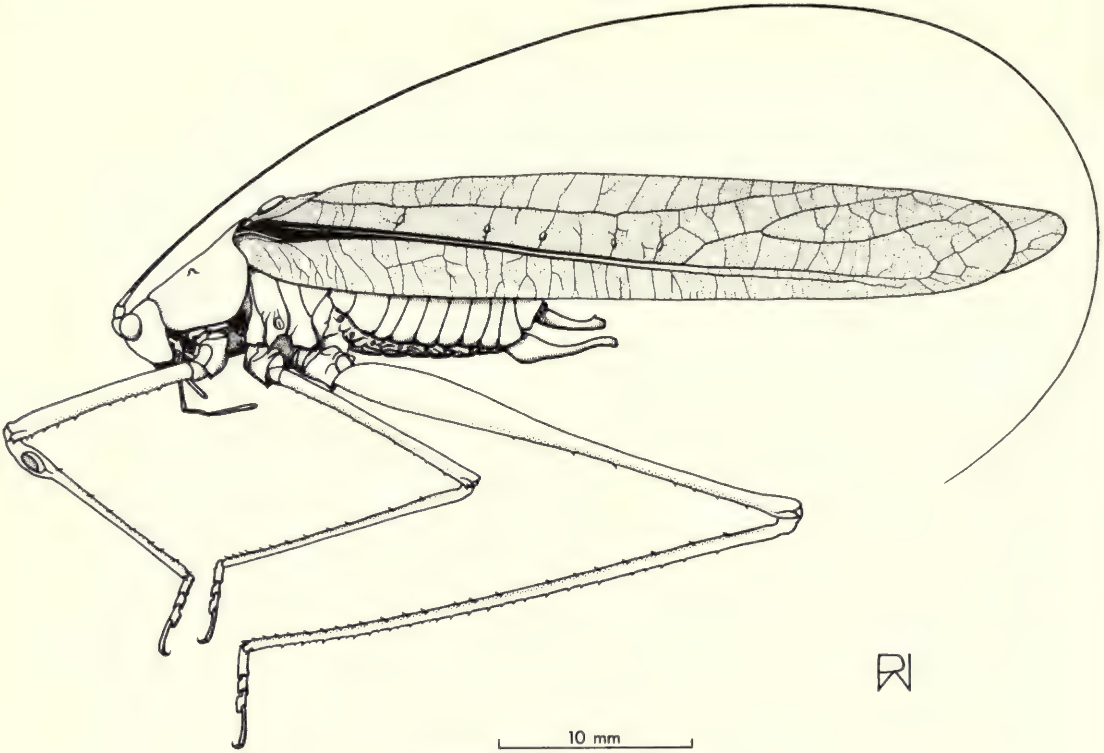


Fig. 184 *Dithela rectiloba*, male.

spine. Femora with ventral spinules. Fore tibiae with open tympanum on each side. Fore and mid tibiae without dorsal spurs. Hind tibiae with three apical spurs on each side. Both pairs of wings fully developed. Fore wings matt or slightly shiny, scarcely translucent; *Sc* and *R* contiguous or almost so for about half their length; area *R* with series of callosities on principal cross-veins; hind margin of male fore wing markedly excavate just beyond stridulatory region. Male tenth abdominal tergite unmodified. Male subgenital plate without styles. Ovipositor well developed, with fine teeth.

DISCUSSION. Both sexes of this genus may be recognized at once by the small tubercles on the pronotum and the callosities in the radial area of the fore wings.

DISTRIBUTION. I have examined specimens from eastern Nigeria, Cameroun, Cabinda and Macías Nguema (Fernando Póo).

INCLUDED SPECIES. *D. acuticercus* Sjöstedt, *D. rectiloba* Karsch.

BUEACOLA Sjöstedt

(Fig. 186)

Bueacola Sjöstedt, 1912: 7. Type-species: *Bueacola cornigera* Sjöstedt, by monotypy.

♂. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above. Eyes oval, prominent. Pronotum with fairly distinct lateral carinae, surface smooth and matt. Fore coxae unarmed. Fore and mid femora unarmed. Hind femora unarmed or with one small ventral spinule. [Single specimen known has one very small spinule on left hind femur but none on right hind femur; larger samples would doubtless include some specimens with more than one spinule on each hind femur and others with none on either.] Fore tibiae with open tympanum on each side. Fore and mid tibiae with dorsal spurs. Hind tibiae with three apical spurs on each side. Both pairs of wings fully developed. Fore wings very slightly shiny and somewhat translucent in places; *Sc* and *R* contiguous at base, separating very slightly towards middle of wing and diverging in distal half; *R* with pectinately arranged posterior branches. Ninth abdominal tergite

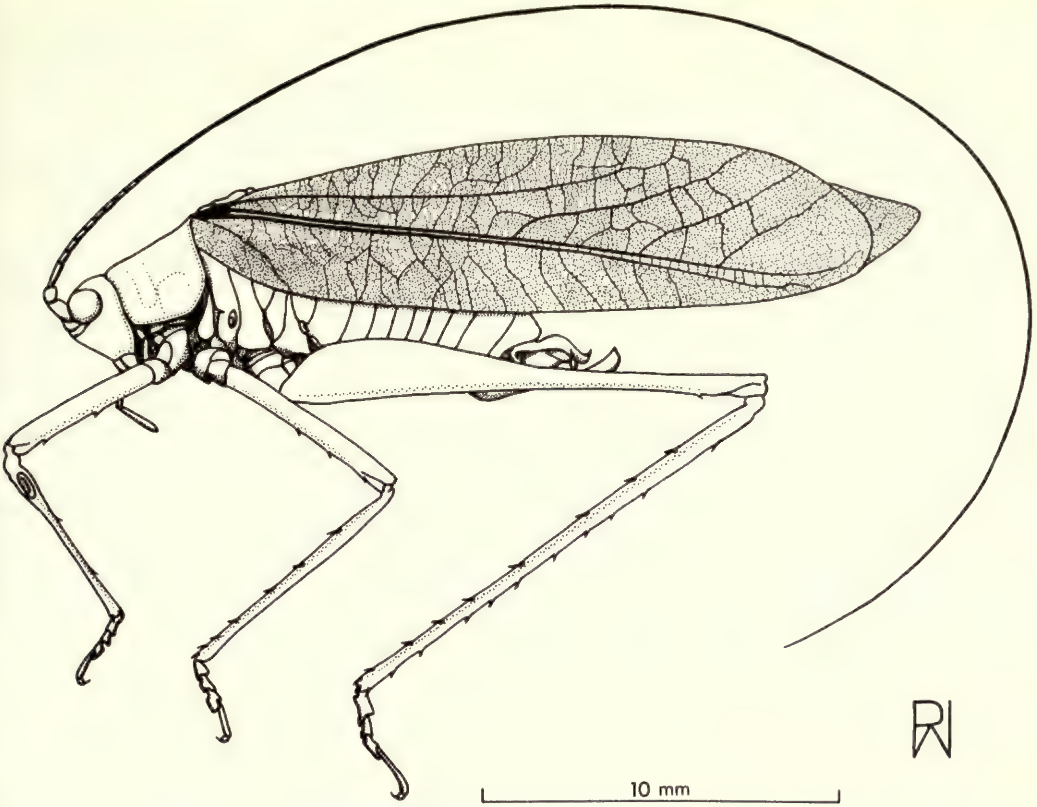


Fig. 185 *Ectomoptera nepicauda*, male.

with slender median posterior process (Fig. 186), slightly downcurved at tip. Tenth abdominal tergite unmodified. Subgenital plate without styles.

♀ unknown.

Discussion. This genus, known only from the unique holotype of *B. cornigera*, appears to have no close relatives among the African Phaneropterinae. The median process on the ninth abdominal tergite is shared with *Scolocerca* but, although these genera have such an unusual character in common, they differ markedly in most other characters (e.g. vertex, pronotum and wing-venation) and are clearly not closely related. The lateral pronotal carinae and pectinately branched *R* in the fore wings are also found together in *Ectomoptera*, but that genus, known only from East Africa, has a quite differently shaped fastigium on the vertex, a rugose pronotal disc and no dorsal spurs on the fore and mid tibiae (except sometimes at the apex); again, there is clearly no close relationship.

Distribution. Known only from the type-locality of the only known species: Buea on the south side of Mont Cameroun.

Included species. *B. cornigera* Sjöstedt.

ECTOMOPTERA gen. n.

Type-species: *Ectomoptera nepicauda* sp. n.

♂♀. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above. Eyes circular, very prominent. Pronotum usually with distinct lateral carinae and with rather indistinct median carina, surface rugose, at least on disc, and more or less shiny; hind margin of male (and sometimes female) pronotum with median indentation. Fore coxae unarmed. Fore and mid femora usually with ventral spinules. Hind femora usually with at least one ventral spinule near apex. Fore tibiae with open tympanum on each side. Fore and mid tibiae without dorsal spurs except sometimes at apex. Hind tibiae with three apical spurs on each side, ventralmost ones somewhat smaller than others. Both pairs of wings fully developed in male (hind wings extending beyond fore wings) but somewhat reduced in female (hind wings not extending beyond fore wings). Fore wings shiny, usually translucent in male but more or less opaque in female; *Sc* and *R* contiguous or almost so for most of their length; *R* with pectinately arranged posterior branches; male fore wings with deep excavation in hind margin just beyond stridulatory region, so that part of metanotum is exposed even when fore wings are flexed (Fig. 187). Male tenth abdominal tergite somewhat enlarged. Male subgenital plate without styles. Ovipositor well developed, with fine teeth.

DISCUSSION. Both sexes of this genus may be recognized by the fairly well defined angle between the lateral lobes and disc of the pronotum and, particularly, by the median carina, which, although rather indistinct, usually extends along the whole length of the pronotal disc. The shape of the stridulatory region of the male fore wings, which is cut away to expose part of the metanotum, is highly characteristic. *Ectomoptera* seems to have no close relatives among the other African Phaneropterinae.

In addition to the type-species there are in the BMNH a male and female (from the Usambara Mountains, Tanzania) of a second species of *Ectomoptera* in which the male cerci and female subgenital plate are quite different in shape from those of *E. nepicauda*. The male is in poor condition, however, and I prefer not to describe this species until more material is available. I have also examined two further female specimens (from the Shimba Hills, Kenya, and Tanga, Tanzania) that seem likely from the shape of the subgenital plate to belong to a third and fourth species of *Ectomoptera*.

DISTRIBUTION. Known only from a small area of southern Kenya and north-eastern Tanzania.

Ectomoptera nepicauda sp. n.

(Figs 185, 187–191)

♂. Lateral lobes of pronotum moderately rugose. Fore femora with about 6–9 ventral spinules. Mid femora with about 2–6 ventral spinules. Hind femora with about 1–2 ventral spinules. Fore tibiae with 3–4 external ventral spurs. Mid tibiae with about 6–8 external ventral spurs. Hind tibiae with about 11–13 external dorsal spines. Hind wings extending beyond fore wings by about tenth length of latter.

Cerci greatly inflated at base, shaped as in Fig. 188. Subgenital plate shaped as in Fig. 189.

General coloration green, with brown markings on stridulatory organ. Femoral and tibial spines and spurs with darkened tip. Cerci darkened at tip. [Holotype discoloured so that most of green colour is lost.]

♀. As male except for wings and genitalia. Hind wings falling short of fore wings by 2–3 mm. Ovipositor shaped as in Fig. 191. Subgenital plate shaped as in Fig. 190.

MEASUREMENTS

	Males	Females
Total length	(3): 24·3–26·9, mean 25·63	(4): 20·5–22·0, mean 21·30
Median length of pronotum	(3): 2·9–3·1, mean 3·03	(4): 3·4–3·7, mean 3·50
Length of hind femur	(3): 12·8–13·4, mean 13·03	(4): 12·0–13·1, mean 12·72
Length of fore wing	(3): 19·0–20·8, mean 19·90	(4): 16·7–18·7, mean 17·82
Length of ovipositor		(4): 5·0–5·2, mean 5·10

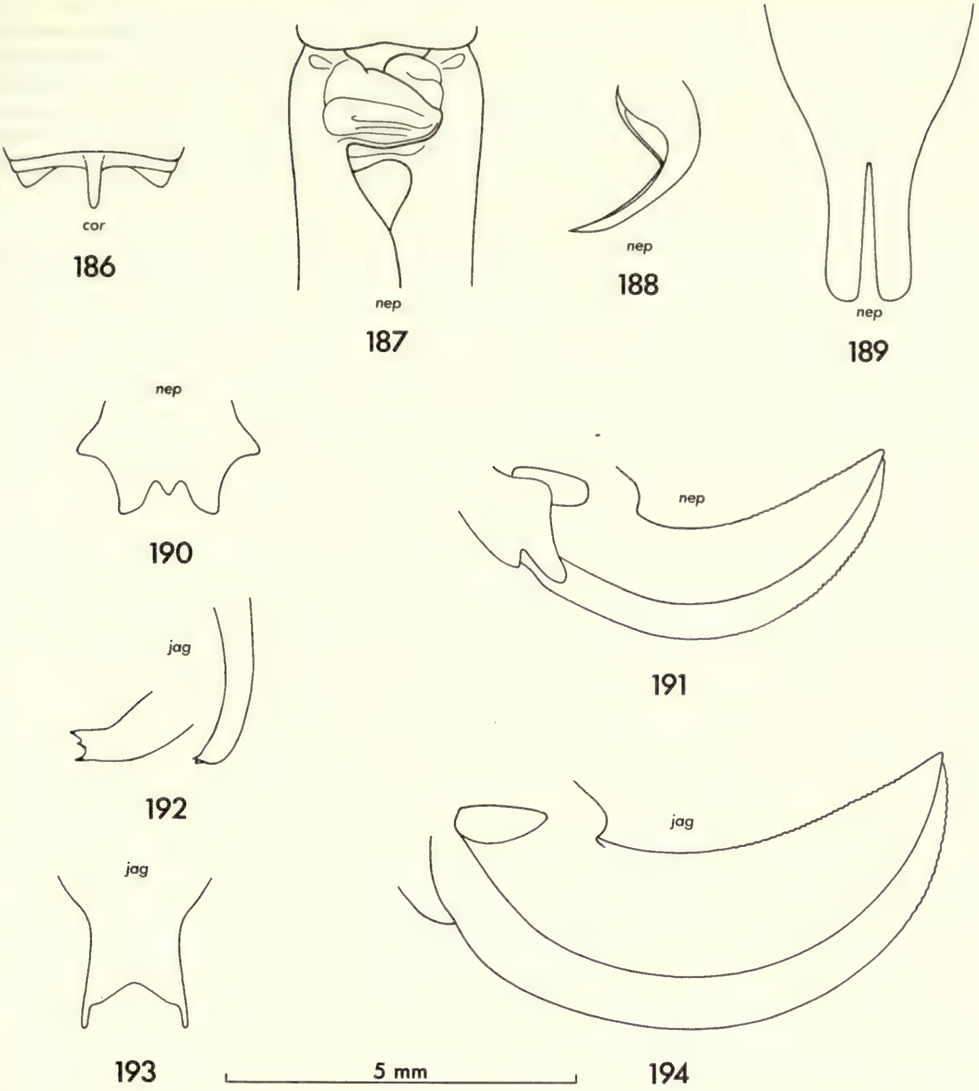
DISCUSSION. The shape of the male cerci and female subgenital plate is highly characteristic of this species. The inflated basal part of the male cerci appears to be at least partly hollow and to have a large inward-facing aperture. One of the male paratypes from Rabai has less translucent fore wings than the other two males of the type-series, but agrees closely with them in all other characters.

MATERIAL EXAMINED

Holotype ♂, **Tanzania**: E. Usambara Mts, Amani Forest Reserve East, near Amani, collected at night, 11.iv.1966 (*Jago*) (BMNH).

Paratypes. **Kenya**: 1 ♂, Rabai, i–ii.1929 (*Gedye*); 1 ♂, 2 ♀, Rabai, viii.1937 (*van Someren*); 2 ♀, Rabai, iv.1928 (*van Someren*).

All in the BMNH.



Figs 186–194 *Bueacola, Ectomoptera* and *Euryastes*. 186. Dorsal view of the male ninth abdominal tergite of *B. cornigera*. 187. Dorsal view of the male stridulatory organ of *Ectomoptera nepicauda*. 188. Dorsal view of the right male cercus of *E. nepicauda*. 189. Ventral view of the male subgenital plate of *E. nepicauda*. 190. Ventral view of the female subgenital plate of *E. nepicauda*. 191. Lateral view of the ovipositor of *E. nepicauda*. 192. Dorsal view of the right male cercus of *Euryastes jagoi* (with further enlarged posterior view of tip). 193. Ventral view of the male subgenital plate of *E. jagoi*. 194. Lateral view of the ovipositor of *E. jagoi*.

DISTRIBUTION. Known only from the Usambara Mountains in north-east Tanzania and Rabai, near Mombasa in Kenya.

EURYASTES gen. n.

Type-species: *Euryastes jagoi* sp. n.

♂♀. Fastigium of vertex compressed, narrower than first antennal segment, sulcate above. Eyes circular, very prominent. Pronotum without lateral carinae, surface smooth and matt. Fore coxae with spine. Fore and mid femora unarmed or with few very small ventral spinules. Hind femora with ventral spinules. Fore tibiae with open tympanum on each side. Fore and mid tibiae with dorsal spurs. Hind tibiae with three apical spurs on each side. Both pairs of wings moderately well developed, extending approximately to hind knees; hind wings not or scarcely extending beyond fore wings. Fore wings moderately shiny and translucent; costal area sharply tapered beyond centre of wing, especially in male; stridulatory region of male fore wings very broad; *Sc* and *R* separate at base (widely in male, slightly in female), then becoming almost contiguous for most of rest of their length. Male tenth abdominal tergite slightly enlarged. Male subgenital plate without styles but produced into two style-like processes. Ovipositor well developed, with fine teeth.

DISCUSSION. Males of the only known species of this genus may be easily recognized by the very broad stridulatory organ and sharply tapered distal part of the rather short fore wings. Both sexes have unusually prominent eyes and rather shallow lateral pronotal lobes, but the females have no other striking characteristics. There appear to be no close relatives among the other African Phaneropterinae.

DISTRIBUTION. Known only from the western Usambara Mountains in north-east Tanzania.

Euryastes jagoi sp. n.

(Figs 192–195)

♂. Fore and mid femora unarmed or with 1–2 very small ventral spinules. Hind femora with about 3–8 ventral spinules. Fore tibiae with 3–5 external ventral spurs. Mid tibiae with 7–8 external ventral spurs. Hind tibiae with about 17–20 external dorsal spines.

Cerci shaped as in Fig. 192. Subgenital plate shaped as in Fig. 193.

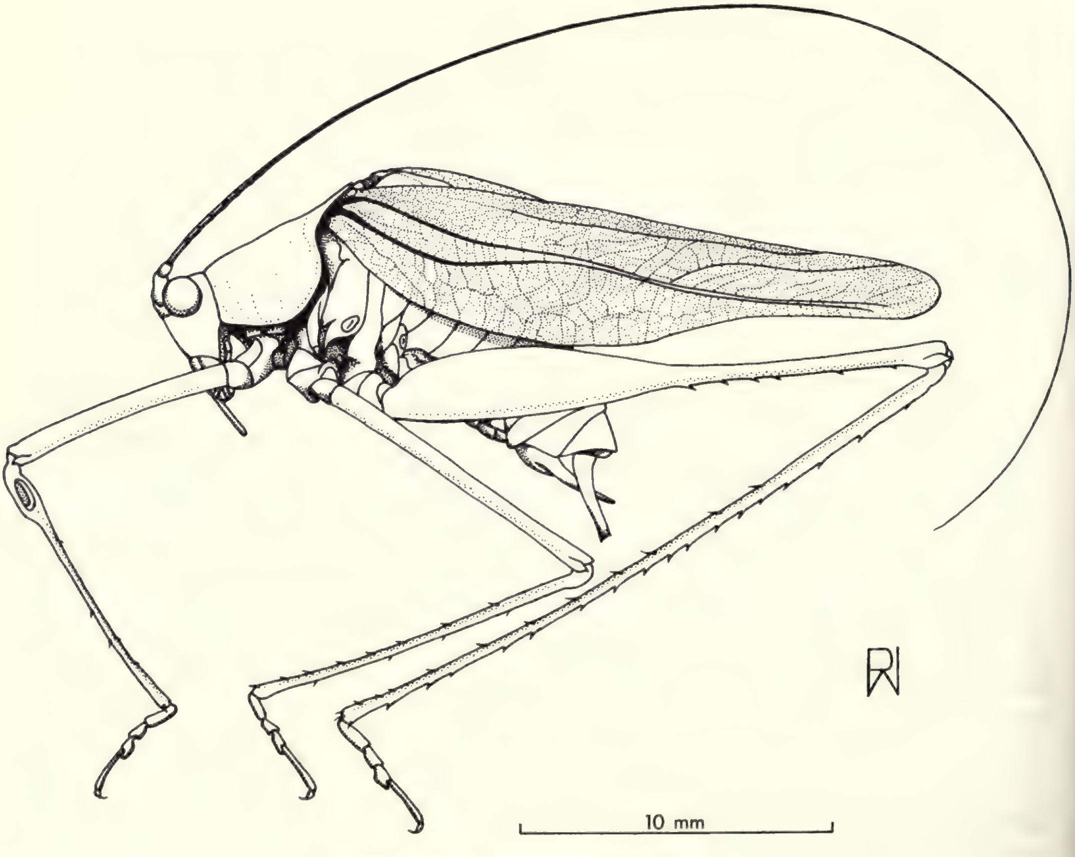


Fig. 195 *Euryastes jagoi*, male.

Coloration almost entirely green. Antennae mostly dark-coloured, with pale bands. Pronotal disc with dark-coloured hind margin. Femoral and tibial spines and spurs with dark tips. Most proximal part of stridulatory organ (adjacent to pronotum when at rest) with dark markings. Cerci darkened at tip. [Holotype discoloured so that much of green colour is lost.]

♀. As male except for fore wings and genitalia. Ovipositor shaped as in Fig. 194, green with margin darkened in dentate region. Subgenital plate simple, triangular.

MEASUREMENTS

	Male	Females
Total length	25·5	(2): 28·5–28·8, mean 28·65
Median length of pronotum	5·4	(2): 4·7–4·7, mean 4·70
Length of hind femur	18·3	(2): 19·7–20·0, mean 19·85
Length of fore wing	19·5	(2): 23·0–23·3, mean 23·15
Length of ovipositor		(2): 7·1–7·2, mean 7·15

DISCUSSION. The cerci, which are tridentate at the tip, and the shape of the subgenital plate are characteristic of the male of this species. The females have no obvious characters likely to be important at the specific level and this sex might well be difficult to identify if further species of *Euryastes* are found.

MATERIAL EXAMINED

Holotype ♂, **Tanzania**: W. Usambara Mts, Mazumbai Forest Reserve, vi.1967 (*Jago*) (BMNH).
Paratypes. 2 ♀, same data and depository as holotype.

DISTRIBUTION. Known only from the type-locality in north-eastern Tanzania.

TERPNISTRIA Stål

(Fig. 196)

Terpnistria Stål, 1873: 42. Type-species: *Phaneroptera zebrata* Serville, by original designation.

♂ ♀. Head with prominent frontogenal carinae. Fastigium of vertex moderately to strongly compressed, narrower than or about same width as first antennal segment, sulcate above. Eyes oval, sometimes almost circular, very prominent. Pronotum with fore and hind parts raised up along mid-line to form prominent median carinae; lateral carinae present in posterior half, though sometimes indistinct; surface smooth and matt but carinae often dentate or crenulate. Fore coxal spine absent or vestigial. Femora with ventral spines, all tending to become broadened at base and more distal ones of hind femora expanded into flat, pointed lobes. Fore tibiae with open tympanum on each side but showing some tendency to develop auricles. Fore and mid tibiae with dorsal spurs towards apex which are replaced by broad-based spines towards base. Hind tibiae with three apical spurs on each side; dorsal hind tibial spines becoming broad-based towards proximal end of tibia, where they are sometimes expanded into flat, pointed lobes. Both pairs of wings fully developed. Fore wings showing tendency to be obliquely truncate at tip, mostly matt and opaque, but sometimes shiny and translucent along anterior margin; *Sc* and *R* contiguous for most of their length. Male tenth abdominal tergite unmodified. Male subgenital plate with styles. Ovipositor well developed, with fine teeth.

DISCUSSION. *Terpnistria* belongs to a well defined group of genera characterized by heavily spined legs (the spines tending to be broad-based and thorn-like), the presence of frontogenal carinae on the head, and, in coloration, a pattern of whitish markings on the predominantly green fore wings and (usually) a narrow dark band along the hind margin of the pronotal disc. This group comprises three allopatric African genera: *Terpnistria* in southern Africa (south of latitude 4°S), *Diogena* in a band of dry savanna and semi-desert stretching from Senegal to Ethiopia (north of the equator and extending into Saudi Arabia) and *Tropidophrys* in the moister parts of West Africa, Zaire and Angola. *Diogena* and *Tropidophrys* lack the prominent median crests on the pronotum shown by *Terpnistria* (though *Diogena* sometimes shows a tendency to develop them), and *Diogena* has in addition fairly well developed auricles on the fore tibial tympana. In spite of this latter character I am including *Diogena* in this review on the grounds that it is clearly a close relative of *Terpnistria* and *Tropidophrys*; these three genera show that the nature of the fore tibial tympana cannot always be taken as a reliable indication of affinity.

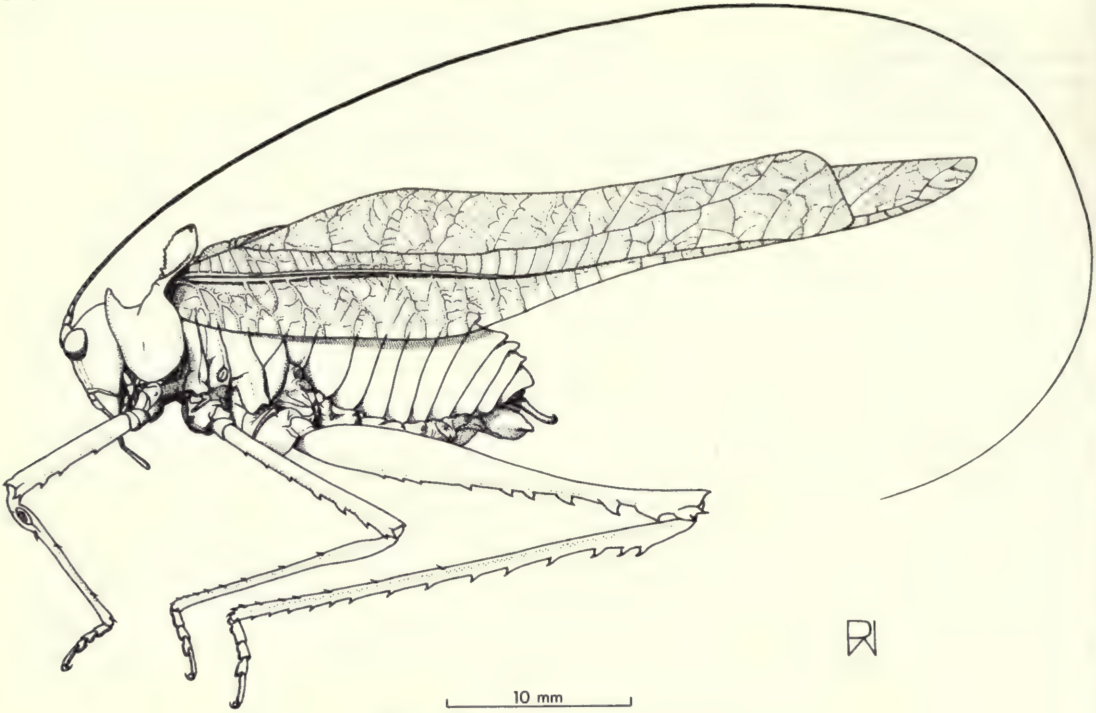


Fig. 196 *Terpnistria zebrata*, male.

I have transferred *T. tuberculata* to the new genus *Terpnistrioides*, which differs from *Terpnistria* in that the fastigium of the vertex is much broader and not sulcate, the fore coxae have a well developed spine, the femoral spinules are unmodified and the pronotum has a rounded tubercle instead of a posterior crest. Two further African genera showing some affinity with this group, *Gelatopoia* and *Milititsa*, both lack frontogenal carinae on the head.

Distribution. Widespread in southern Africa and extending northwards in East Africa to about latitude 4°S.

Included species. *T. lobulata* Stål, *T. zebrata* (Serville).

DIOGENA Brunner

Diogena Brunner, 1878: 224. Type-species: *Phaneroptera fausta* Burmeister, by monotypy.

♂ ♀. Head with prominent frontogenal carinae. Fastigium of vertex moderately compressed, narrower than first antennal segment, sulcate above though sometimes not very distinctly so. Eyes oval, sometimes almost circular, very prominent. Pronotum without median carina though sometimes with anterior, and to lesser extent posterior, margins raised up into point; lateral carinae present in posterior half and often raised into prominent ridges or tubercles; surface smooth and matt but lateral carinae showing tendency to be rugose. Fore coxae with small or fairly well developed spine. Femora with ventral spines, all tending to become broadened at base and more distal ones, especially those of hind femur, expanded into flat, pointed lobes. Fore tibiae with auriculate tympanum on each side, but auricles are not always very well developed. Fore and mid tibiae with dorsal spurs, which are sometimes replaced by broad-based spines towards base of tibia. Hind tibiae with three apical spurs on each side; dorsal hind tibial spines broad-based and flat except, usually, near apex of tibia. Both pairs of wings fully developed. Fore wings showing tendency to be obliquely truncate at tip, matt and mostly opaque but usually with translucent band near anterior margin; *Sc* and *R* contiguous for most of their length. Male tenth abdominal tergite unmodified. Male subgenital plate with styles. Ovipositor well developed, with fine teeth.

DISCUSSION. *Diogena* may be easily distinguished from the closely related genera *Terpnistria* and *Tropidophrys* by the auriculate tympana, which would normally have been sufficient to exclude it from this review (see remarks on p. 169). The characteristics that these genera have in common, mentioned on p. 169, serve to distinguish *Diogena* from all the other African Phaneropterinae.

DISTRIBUTION. *Diogena* occurs in a broad band of relatively dry country extending across Africa from Senegal to Ethiopia and the Somali Republic; it is also found in the western and southern parts of the Arabian Peninsula. In West Africa it seldom occurs south of latitude 8°S, but in Zaire and East Africa its range extends southwards to near the equator. Northwards it occurs well into the semi-desert southern fringe of the Sahara, the Hoggar and the southern foothills of the Atlas Mountains.

INCLUDED SPECIES. *D. denticulata* Chopard, *D. fausta* (Burmeister).

TROPIDOPHRYS Karsch

Tropidophrys Karsch, 1896: 340. Type-species: *Tropidophrys amydra* Karsch, by monotypy.

♂♀. Head with prominent frontogenal carinae. Fastigium of vertex hardly compressed, broader than first antennal segment, sloping steeply to frons, usually slightly sulcate above. Eyes oval, sometimes almost circular, prominent. Pronotum raised along anterior margin but without median carina or point; lateral carinae present in posterior half, though sometimes indistinct; surface smooth and matt. Fore coxae with spine. Fore and mid femora with ventral spinules. Hind femora with ventral spines, more distal ones broad-based and rather flattened. Fore tibiae with largely open tympanum on each side, but showing some tendency to develop auricles. Fore and mid tibiae almost always with dorsal spurs, which are sometimes replaced by more or less broad-based spines towards base of tibia. Hind tibiae with three apical spurs on each side; dorsal hind tibial spines broad-based and rather flattened. Both pairs of wings fully developed. Fore wings opaque and mostly matt, but sometimes with white patches that are rather shiny; *Sc* and *R* contiguous for most of their length. Male tenth abdominal tergite unmodified. Male subgenital plate with styles. Ovipositor well developed, with fine teeth.

DISCUSSION. *Tropidophrys* lacks the prominent median pronotal crests of *Terpnistria* and may be distinguished from *Diogena* by the weakly developed tympanal auricles; in addition, the fastigium of the vertex is broader than in these genera and the fore wings are more rounded at the tip, not usually showing more than the slightest tendency to be obliquely truncate.

There are at least two undescribed species represented among material I have on loan from various sources and, although I prefer not to describe them until more material is available, they are taken into account in the generic diagnosis.

DISTRIBUTION. *Tropidophrys* is primarily a West African genus, occurring from Guinea to Cameroun and Gabon in moister vegetation zones than *Diogena*. It also occurs in parts of Angola and Zaire.

INCLUDED SPECIES. *T. amydra* Karsch.

TERPNISTRIOIDES gen. n.

Type-species: *Terpnistria tuberculata* Chopard.

♂. Head with rather weakly developed frontogenal carinae. Fastigium of vertex sloping steeply to frons, broader than first antennal segment, somewhat concave above. Eyes oval, very prominent. Pronotum markedly raised along anterior margin but without median carina; posterior margin raised to form large rounded median tubercle; lateral carinae present in anterior half and towards posterior margin, but weakly developed; surface smooth and matt. Fore coxae with spine. Femora with unmodified ventral spinules. Fore tibiae with open tympanum on each side. [Dorsal armature of fore tibiae not mentioned in original description; mid legs were lacking at that time and fore legs are now also lacking.] Hind tibiae with three apical spurs on each side; dorsal hind tibial spines broad-based, flattened and lamellate, especially towards base, where they are expanded into lobes. Both pairs of wings fully developed. Fore wings somewhat truncate at tip, matt and opaque; *Sc* and *R* slightly separated near base, but contiguous or almost so for most of rest of their length. Tenth abdominal tergite much enlarged, with median posterior projection. [Subgenital plate damaged.]

♀ unknown.

DISCUSSION. The rounded tubercle on the pronotum is unique in the African Phaneropterinae and distinguishes *Terpnistrioides* from *Gelatopoia*, its nearest apparent relative. Although showing some resemblance in general appearance to *Terpnistria* and its relatives *Diogena* and *Tropidophrys*, *Terpnistrioides* differs from all three genera in the broad fastigium of the vertex and the unmodified femoral spinules.

This genus is known only from the unique male holotype of the type-species. This specimen already lacked mid legs at the time of its original description and now also lacks fore legs; in addition, the pronotal tubercle is now unfortunately also missing, but was illustrated by Chopard (*in* Chopard & Kevan, 1954: fig. 8).

DISTRIBUTION. Known only from the type-locality of the type-species in eastern Kenya.

INCLUDED SPECIES. *T. tuberculatus* (Chopard) **comb. n.**

GELATOPOIA Brunner

(Fig. 197)

Gelatopoïa Brunner, 1891: 111. Type-species: *Gelatopoia bicolor* Brunner, by monotypy.
Gelatopoia Brunner; Bolívar, 1906: 349.
Gelatopoea Kirby, 1906: 439. [Unjustified emendation.]

♂ ♀. Fastigium of vertex not compressed, broader than first antennal segment, broadly sulcate above. Eyes oval, very prominent. Pronotum with anterior and, to lesser extent, posterior margins raised up into point; posterior part of disc extended sideways and raised upwards somewhat to form rounded posterolateral lobes; lateral carinae weakly developed near anterior margin but otherwise virtually absent; surface smooth, disc matt but lateral lobes slightly shiny. Fore coxae with spine. Femora with ventral spinules; hind femora with subapical ventral flange on each side, external one sometimes developed into large and conspicuous spined lobe; similar flange usually developed to some extent internally on fore femora and externally on mid femora. Fore tibiae with open tympanum on each side. Fore and mid tibiae without dorsal spurs except at apex. Mid and hind tibiae with broad-based, thorn-like dorsal spines on each side. Hind tibiae with three apical spurs on each side. Both pairs of wings fully developed. Fore wings slightly shiny and showing tendency to become translucent except for pigmented patches; *Sc* and *R* contiguous or almost so for most of their length. Male tenth abdominal tergite unmodified. Male subgenital plate without styles but with two style-like processes. Ovipositor well developed, with fine teeth or crenulation and with small lateral protuberance at base of ventral valves.

DISCUSSION. *Gelatopoia* is similar in many respects to *Terpnistrioides*, but has a quite differently shaped pronotum. It may be distinguished from *Terpnistria* and its close relatives by the broad fastigium of the vertex and the lack of frontogenal carinae. In practice *Gelatopoia* may be more easily recognized by its striking colour pattern, the dark brown markings on the pronotum, legs, fore wings and elsewhere contrasting with the general pale grey-green colouring (which usually becomes a pale creamy brown in dried specimens). This colour pattern seems to be associated with the similarly coloured lichens on which it lives and, at least in captivity, feeds (A. W. R. McCrae, *in lit.*).

DISTRIBUTION. West Africa and parts of Zaire, Angola and Uganda.

INCLUDED SPECIES. *G. bicolor* Brunner.

TRIGONOCORYPHA Stål

Trigonocorypha Stål, 1873: 39. Type-species: *Locusta crenulata* Thunberg [= *Trigonocorypha unicolor* (Stoll)], by original designation.

♂ ♀. Fastigium of vertex somewhat compressed, narrower at tip than first antennal segment, usually sulcate above but sometimes very weakly so. Eyes oval, moderately prominent. Pronotum with pronounced, crenulate lateral carinae, surface rugose or punctate, matt. Fore coxae with small or vestigial spine. Fore

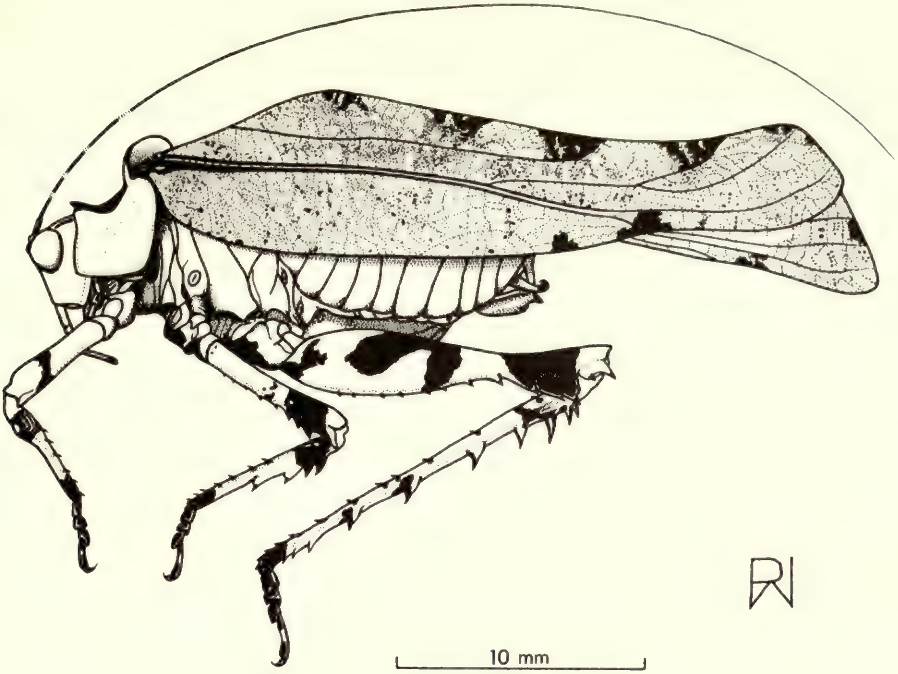


Fig. 197 *Gelatopoia bicolor*, male.

and mid femora usually, and hind femora always, with ventral spinules. Fore tibiae with open tympanum on each side, but often showing tendency (sometimes well marked) to develop auricles. Fore and mid tibiae usually with at least one dorsal spur in addition to apical ones. Hind tibiae usually with three apical spurs on each side. Both pairs of wings fully developed. Fore wings matt or slightly shiny, opaque; *Sc* and *R* contiguous except near apex. Male tenth abdominal tergite unmodified. Male subgenital plate with styles. Ovipositor well developed or (*T. maxima* Carl) rather small, with fine teeth.

DISCUSSION. This is a primarily Oriental genus and, although occurring in Madagascar and the south-west of the Arabian Peninsula, is not yet known from Africa itself. The only African genera in which the pronotum has such pronounced and crenulate lateral carinae (e.g. *Plangiopsis*) have much better developed tympanal auricles, at least on the inner side.

I am including *T. angustata*, described from Iraq, as an Arabian species on the strength of a female specimen from Oman in the BMNH that agrees well with the holotype.

DISTRIBUTION. Occurring widely in southern Asia, from the Arabian Peninsula to Indonesia, and also in Madagascar.

INCLUDED SPECIES OCCURRING IN THE ARABIAN PENINSULA. *T. angustata* Uvarov, *T. tihamae* Uvarov.

SYMMETROPLEURA Brunner

Symmetropleura Brunner, 1878: 245. Type-species: *Symmetropleura laevicauda* Brunner, by subsequent designation (Kirby, 1906: 446).

Cameronia Karsch, 1889: 450. Type-species: *Symmetropleura africana* Brunner, by monotypy.

♂ ♀. Fastigium of vertex compressed, narrower than first antennal segment (but hardly so in *S. africana*), sulcate (or at least concave) above. Eyes oval, prominent. Pronotum without lateral carinae, surface smooth or punctate, matt or shiny. Fore coxae with spine. Femora with ventral spinules. Fore tibiae with open tympanum on each side, but sometimes (*S. africana*) showing tendency to develop auricle on inner side. Fore and mid tibiae with one or more dorsal spurs in addition to apical one. Hind tibiae with three apical spurs on each side. Both pairs of wings fully developed. Fore wings opaque or slightly translucent, shiny; *Sc* and *R* contiguous except near apex. Tenth abdominal tergite unmodified or enlarged. Male subgenital plate without styles. Ovipositor well developed, with fine or coarse teeth.

Discussion. The two African species of *Symmetropleura* are not very similar either to each other or to the Neotropical type-species of the genus, but the differences are of the kind usually used at the specific level in the Phaneropterinae and so I have considered it best, at least for the time being, to treat them as congeneric. *S. africana* differs from *S. laevicauda* and *S. plana* in the shape of the fastigium of the vertex, which is similar to that of *Dapanera* Karsch; however, the inner tympana of *S. africana* lack the well developed auricles shown by *Dapanera*, and the male genitalia are also of a quite different type. *S. plana* is quite close to *S. laevicauda* in the shape of the fastigium of the vertex, but differs from both the other two species in having narrower fore wings and a smaller ovipositor with much coarser teeth.

Distribution. As constituted at present, *Symmetropleura* occurs widely in South America, Mexico and eastern U.S.A.; in the Old World it is known only from Africa and Madagascar. Of the two African species, *S. plana* occurs in South Africa (Natal, southern and eastern Cape Province) and *S. africana* in Congo, Zaire and Angola.

Included african species. *S. africana* Brunner, *S. plana* (Walker).

CORYCOMIMA Karsch

(Fig. 198)

Corycomima Karsch, 1889: 457 (proposed conditionally, but available from this date under Article 17 (8) of the *International Code of Zoological Nomenclature*). Type-species: *Plangia camerata* Karsch, by monotypy.

Corycomima Karsch; Karsch, 1896: 343 (proposed unconditionally).

♂ ♀. Fastigium of vertex sloping more or less steeply to frons, at least as broad as first antennal segment, with median sulcus. Eyes oval, sometimes almost circular, usually not very prominent. Pronotum without lateral carinae, surface punctate and shiny. Fore coxae with small spine. Femora with ventral spinules but those of fore and mid femora very small, sometimes hardly visible. Fore tibiae with open tympanum on each side. Fore and mid tibiae usually without dorsal spurs except at apex, but mid tibiae occasionally with dorsal spurs in addition to apical one. Hind tibiae with three apical spurs on each side. Both pairs of wings moderately well developed but not very long; hind wings not extending beyond fore wings. Fore wings tending to form rounded point at tip, thick in texture, shiny and opaque or almost so; *Sc* and *R* contiguous except at apex. Male tenth abdominal tergite unmodified. Male subgenital plate with large styles. Ovipositor well developed but rather small, with fine teeth on upper valve.

Discussion. *Corycomima* may be easily recognized by its short, squat appearance and rather leathery, shiny and characteristically shaped fore wings, which completely cover the hind wings. The general appearance is matched to some extent by *Physocorypha* Karsch, in which, however, the vertex is quite different in shape and the tympana are auriculate.

Only one species has so far been described, but I have examined specimens (some in the BMNH collection and others on loan from various other museums) of a number of further species; most of these are represented only by single specimens and so I have thought it unwise to describe them until further material is available, but I have broadened the generic diagnosis to take them into account. The males of *C. camerata* and of what are probably two undescribed but closely related species have the more proximal of the internal dorsal spines of the hind tibiae much enlarged; males of the remaining species I have examined have unmodified hind tibial spines.

I have found from an examination of the holotypes that Kirby (1906: 465) was mistaken in considering *Orophus flavescens* Walker to be a senior synonym of *C. camerata*; it is clearly distinct, even at the generic level, and I am here transferring it to *Eurycorypha* (see p. 180).

Distribution. *C. camerata* is known only from Cameroun, but the further specimens of *Corycomima* mentioned above come from Congo, Zaire and Uganda.

Included species. *C. camerata* (Karsch) **nom. rev.**

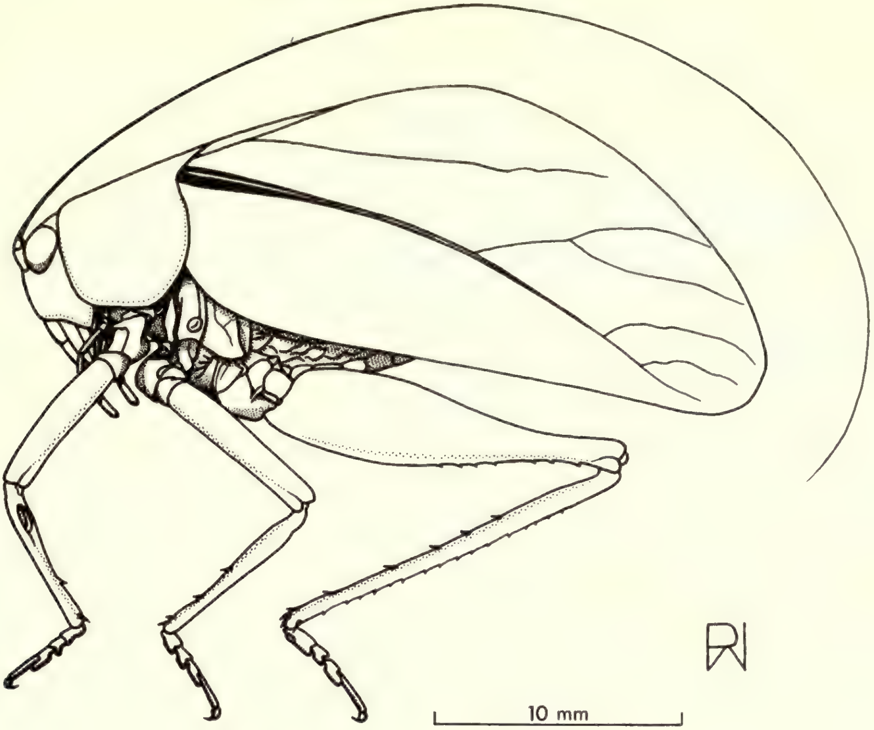


Fig. 198 *Corycomima camerata*, female.

PLANGIA Stål

Plangia Stål, 1873: 40. Type-species: *Phylloptera graminea* Serville, by original designation.

♂♀. Fastigium of vertex usually sloping steeply to frons, at least as broad as, and often broader than, first antennal segment, with or without median sulcus. Eyes oval, sometimes fairly prominent. Pronotum without lateral carinae but sometimes showing fairly clear angle between disc and lateral lobes, surface punctate or at least partly so, shiny. Fore coxae with spine. Femora with ventral spinules. Fore tibiae with open tympanum on each side. Fore and mid tibiae without dorsal spurs except at apex. Hind tibiae with three apical spurs on each side. Both pairs of wings fully developed. Fore wings shiny and fairly translucent or matt and opaque; *Sc* and *R* contiguous except near apex. Male tenth abdominal tergite unmodified or somewhat enlarged. Male subgenital plate with styles. Ovipositor well developed, with fine teeth.

DISCUSSION. *Plangia* is a rather nondescript genus, characterized mainly by negative features. *Monteiroa* (probably its closest relative), *Eurycorypha* and *Oxygonatium* may all be distinguished from it by their exceptionally broad fastigia, and *Plangiodes* by its frontogenal carinae and elongate eyes.

I have found from an examination of the holotype that *Orophus compressus* Walker, assigned to *Eurycorypha* by Kirby (1906: 462), actually belongs to *Plangia*, and so I am adding it to the list of included species below.

DISTRIBUTION. *Plangia* occurs throughout Africa south of the Sahara, and also in Madagascar and the Seychelles.

INCLUDED AFRICAN SPECIES. *P. compressa* (Walker) **comb. n.**, *P. graminea deminuta* Griffini, *P. g. graminea* (Serville), *P. karschi* Chopard, *P. laminifera* Karsch, *P. nebulosa* Karsch, *P. unimaculata* Chopard, *P. villiersi* Chopard.

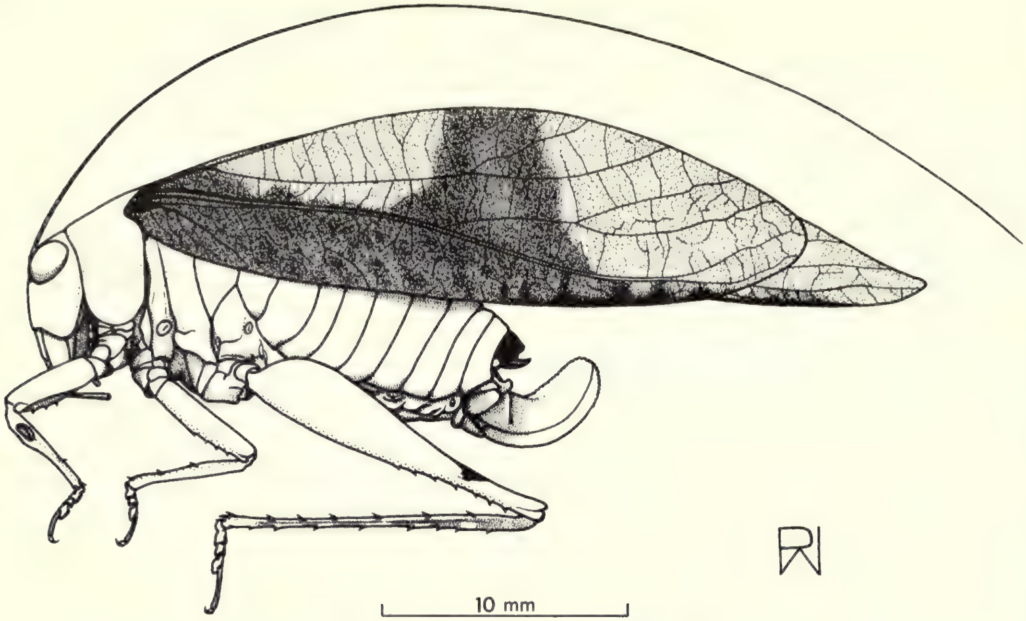


Fig. 199 *Monteiroa nigricauda*, male.

MONTEIROA Karsch

Monteiroa Karsch, 1889: 458. Type-species: *Monteiroa latifrons* Karsch, by monotypy.

♂♀. Fastigium of vertex sloping steeply to frons, much broader than first antennal segment, meeting equally broad fastigium of frons along horizontal line, with weak median sulcus. Eyes oval, moderately prominent. Pronotum without lateral carinae, surface punctate, shiny or fairly matt. Fore coxae with spine. Femora with ventral spinules. Fore tibiae with open tympanum on each side; dorsal spurs absent except for apical one. Mid tibiae with or without dorsal spurs in addition to apical one. Hind tibiae with three apical spurs on each side. Both pairs of wings fully developed. Fore wings slightly shiny, opaque or almost so; *Sc* and *R* contiguous except near apex. Male tenth abdominal tergite unmodified. Male subgenital plate with styles. Ovipositor well developed, with fine teeth.

DISCUSSION. *Monteiroa* is very similar to *Plangia* in most respects, but differs from it in having broader fastigia (about three times as broad as the first antennal segment). *Eurycorypha* and *Oxygonatium* have equally broad fastigia, but the former may be distinguished from *Monteiroa* by its frontogenal carinae and the latter by the extended point at the tip of its hind femora.

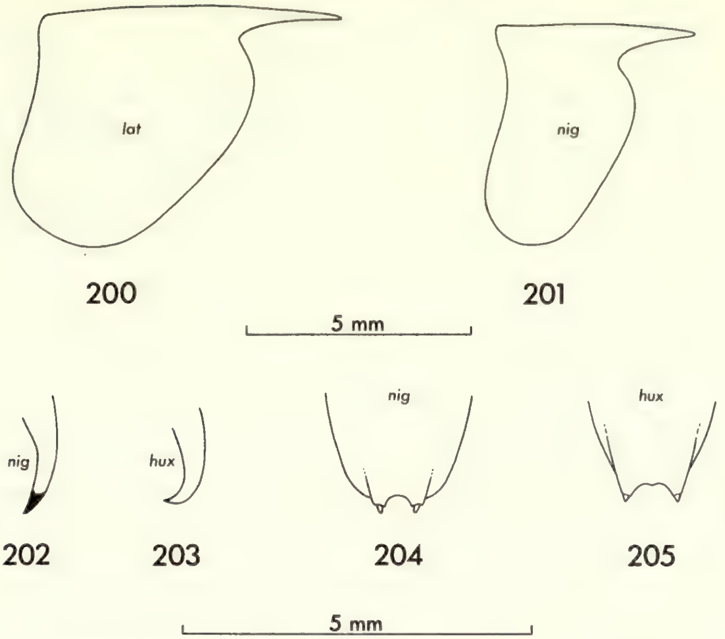
Until now this genus has included the single species *M. latifrons*, described from Mozambique. However, I have assembled during this study two males and 16 females of an undescribed West African species that I think is best assigned, at least for the time being, to *Monteiroa*. It is a more elongate insect than *M. latifrons* and has narrower lateral pronotal lobes, but the two species are very similar in most other respects.

DISTRIBUTION. West Africa (from Guinea to northern Zaire) and Mozambique.

Key to the species of *Monteiroa*

1 Lateral pronotal lobes shaped as in Fig. 200. Suture between fastigia of vertex and frons slightly curved upwards . . . . ***M. latifrons*** Karsch (p. 177)

– Lateral pronotal lobes shaped as in Fig. 201. Suture between fastigia of vertex and frons straight or slightly curved downwards . . . . ***M. nigricauda*** sp. n. (p. 178)



Figs 200–205 *Monteiroa* and *Oxygonatium*. 200, 201. Lateral view of the pronotum of (200) *M. latifrons* and (201) *M. nigricauda*. 202, 203. The right male cercus of (202) *M. nigricauda* (dorsolateral view) and (203) *O. huxleyi* (dorsal view). 204, 205. Ventral view of the male subgenital plate of (204) *M. nigricauda* and (205) *O. huxleyi*.

Monteiroa latifrons Karsch

(Fig. 200)

Monteiroa latifrons Karsch, 1889: 458. LECTOTYPE ♂, MOZAMBIQUE: Delagoa Bay (MNHU, Berlin), here designated [examined].

DIAGNOSIS. ♂ ♀. Suture between fastigia of vertex and frons slightly curved upwards. Lateral pronotal lobes shaped as in Fig. 200. Tenth abdominal tergite and supra-anal plate not coloured differently from remaining tergites.

MEASUREMENTS

	Male lectotype	Female paralectotype
Total length	—	34·2
Median length of pronotum	6·2	6·6
Length of hind femur	14·2	15·5
Length of fore wing	29·0	27·4

DISCUSSION. This species is well separated geographically in Africa from *M. nigricauda*, from which it may be easily distinguished by its uniform green colouring and the shape of the lateral pronotal lobes.

M. latifrons was described from two syntypes of opposite sex; I have selected and labelled the male (which bears the number 6148) as lectotype.

MATERIAL EXAMINED

Lectotype ♂, **Mozambique**: Delagoa Bay (*Monteiro*) (MNHU, Berlin).
Mozambique: 1 ♀ paralectotype, same data and depository as lectotype.

DISTRIBUTION. Known only from the type-locality in the extreme south of Mozambique.

Monteiroa nigricauda sp. n.

(Figs 199, 201, 202, 204)

Diagnosis. ♂ ♀. Suture between fastigia of vertex and frons straight or slightly curved downwards. Lateral pronotal lobes comparatively deep and narrow, as in Fig. 201. Supra-anal plate and most of tenth abdominal tergite black, contrasting with paler colour of remaining abdominal tergites.

Description. ♂. Suture between fastigia of vertex and frons straight or slightly curved downwards.

Lateral pronotal lobes comparatively deep and narrow, as in Fig. 201. Fore femora with 2–4 ventral spinules, all internal. Mid femora with 2–4 ventral spinules, all external. Hind femora with 6–8 ventral spinules, all external. Fore tibiae with 1–2 external ventral spurs. Mid tibiae with 3–5 external ventral spurs. Hind tibiae with about 7–9 external dorsal spines.

Cerci shaped as in Fig. 202. Subgenital plate shaped as in Fig. 204.

Males examined mostly yellowish brown, but colouring in life probably at least partly green (see description of female). Tympana at least partly dark brown or black. Hind femora with black dorsal spot towards distal end. Hind tibiae with dark brown or black stripe along dorsal surface and along each side. Femoral and tibial spines and spurs with dark tip. Fore wings with dark patches. Exposed part of costal and subcostal areas of hind wings partly red-brown or black. Supra-anal plate and most of tenth abdominal tergite black, contrasting with paler colour of remaining abdominal tergites. In paratype part of head, lateral pronotal lobes, parts of thoracic pleura, parts of fore and mid femora and parts of abdominal tergites are red-brown, but these markings are not shown by holotype.

♀. As male except for fore wings, genitalia and coloration. Ovipositor of simple, *Phaneroptera*-like type. Head and pronotum green above; front of head mostly blue-green. Sides of head and thorax, and fore and mid femora, mostly pale brown; hind femora pale brown at base, becoming darker in distal half. Abdominal tergites (except for tenth tergite and supra-anal plate) pale or reddish brown with green or blue-green lateral patches. Fore and mid tibiae and all tarsi green. Fore wings with precostal and costal areas and large central part of radial and medial areas mottled brown; remainder of fore wings green except for relatively small brown area posterior to base of *R*. Ovipositor mostly reddish brown. Remainder of coloration as given for male. Some females have red-brown markings shown by male paratype. [Description of female coloration based partly on colour photograph of live female, kindly provided by Dr Y. Gillon.]

Measurements

	Males	Females
Total length	(2): 32·0–32·2, mean 32·10	(14): 32·5–37·6, mean 34·99
Median length of pronotum	3·9	(13): 4·0–4·5, mean 4·28
Length of hind femur	(2): 11·3–12·0, mean 11·65	(15): 11·8–14·2, mean 12·80
Length of fore wing	(2): 23·8–25·5, mean 24·65	(16): 24·9–28·4, mean 26·68
Length of ovipositor		(7): 4·9–5·4, mean 5·14

Discussion. The conspicuously black tenth abdominal tergite and supra-anal plate provide a useful spot character for recognizing *M. nigricauda*. The relatively deep and narrow lateral pronotal lobes also enable this species to be readily distinguished from *M. latifrons*.

It is rather curious that the fore wings of the two males in the type-series should differ in colour pattern from those of the 16 females, but I suspect that this is simple colour variation and not a real sexual difference. Although none of the females were collected from exactly the same localities as the two males, the close resemblance between the two sexes in all other aspects of coloration and in all non-sexual characters makes it virtually certain that they are conspecific.

Material examined

Holotype ♂, **Ivory Coast**: Lamto (Toumodi), at light, 1–12.xi.1968 (*Girard*) (IFAN, Dakar).

Paratypes. **Guinea**: 1 ♀, Nimba Mts, Ziéla, 24.v.1957 (*Lamotte, Amiet & Vanderplaetsen*) (MNHN, Paris). **Liberia**: 1 ♀, near Monrovia, Bomi Hills, 8 km NE. of Mines, 23.vii.1963 (*Jago*). **Ivory Coast**: 1 ♀, Adiopodoumé, 6.iv.1950; 1 ♀, Adiopodoumé, 9.ix.1963; 1 ♀, Adiopodoumé, 7.iii.1967 (*Gillon*); 1 ♀, Banco Forest, 15.x.1963. **Ghana**: 1 ♀, Western Region, near Wiawso, 5 km NW. of Tano Lodge, 14.x.1960 (*Jago*); 1 ♀, Eastern Region, Kade Research Farm, 30.x.1961 (*Jago*); 1 ♀, Eastern Region, Kade Agricultural Research Station, forest near dam, 14.xii.1963 (*Acheampong*); 1 ♀, Tafo, 6.iii.1962 (*Gerard*). **Nigeria**: 1 ♀, south, Cross River, Ikom, x.1916 (*Pomeroy*); 1 ♀, Bendel State, 38 km S. of Benin, Sapoba Forestry Station, 10–11.i.1961 (*Jago*); 3 ♀, near Ibadan, Gombar, at light, 11.i.1965 (*Gerard*). **Congo**: 1 ♀, Dimonika

(Mayumbe), i.1964 (*Descarpentries & Villiers*) (MNHN, Paris). **Zaire**: 1 ♂, Bumba, xii.1939–i.1940 (*De Saeger*) (MRAC, Tervuren).

In the BMNH unless otherwise stated.

Distribution. *M. nigricauda* seems to be typically a forest insect, occurring widely in West Africa from Guinea to northern Zaire.

PLANGIODES Chopard

Plangiodes Chopard, *in* Chopard & Kevan, 1954: 330. Type-species: *Plangiodes carinatus* Chopard, by original designation.

♂. Head with prominent frontogenal carinae. Fastigium of vertex sloping steeply to frons, slightly broader than first antennal segment, with median sulcus. Eyes oval and elongate, very prominent. Pronotum with lateral carinae, surface fairly smooth and moderately shiny. Fore coxae with spine. Femora with ventral spinules. Fore tibiae with open tympanum on each side. Fore and mid tibiae without dorsal spurs except at apex. Hind tibiae with three apical spurs on each side. Both pairs of wings fully developed. Fore wings very slightly shiny, opaque; *Sc* and *R* contiguous except near apex. Tenth abdominal tergite with median posterior projection. Subgenital plate with styles.

♀ unknown.

Discussion. *Plangiodes* is a close relative of *Eurycorypha*, differing from it only in the narrower fastigia of the vertex and frons.

Distribution. Known only from north-eastern Kenya.

Included species. *P. carinatus* Chopard.

EURYCORYPHA Stål

(Fig. 206)

Eurycorypha Stål, 1873: 40. Type-species: *Phylloptera cereris* Stål, by original designation.
Myrmecophana Brunner, 1883: 248. Type-species: *Myrmecophana fallax* Brunner, by monotypy.

♂. Head with prominent frontogenal carinae. Fastigium of vertex sloping steeply to frons, slightly broader broader than first antennal segment, meeting equally broad fastigium of frons along horizontal line, with or without median sulcus. Eyes oval and elongate, prominent. Pronotum with lateral carinae (or at least clear angle between horizontal disc and vertical lateral lobes), surface smooth, punctate or rugose, matt or shiny. Fore coxae with spine. Femora with ventral spinules. Fore tibiae usually with open tympanum on each side, but often showing some tendency to develop ventral auricles and sometimes (some specimens of *E. ornatipes*) inner auricle quite well developed. Fore and mid tibiae without dorsal spurs except at apex, but sometimes (one undescribed species in BMNH) with dorsal spines near base. Hind tibiae with three apical spurs on each side. Both pairs of wings fully developed. Fore wings usually shiny but sometimes matt, opaque but sometimes showing tendency to become translucent; *Sc* and *R* contiguous except near apex. Male tenth abdominal tergite unmodified, enlarged or with median posterior projection. Male subgenital plate with or without styles, or with style-like processes. Ovipositor varying in different species from being very short to being relatively large and robust, but always with fine teeth or crenulation (although this is sometimes confined to apical region of upper valves).

Discussion. *Eurycorypha* may be recognized easily from the head alone, with its combination of frontogenal carinae, elongate eyes and very broad fastigia of the vertex and frons (usually at least twice as broad as the first antennal segment). *Oxygonatium* has equally broad fastigia and elongate eyes, but lacks frontogenal carinae and has a conspicuously extended point at the tip of the hind femora. *Monteiroa* also has broad fastigia, meeting similarly in an almost straight horizontal line, but has a generally more rounded head, without frontogenal carinae and with eyes that, although oval, are not elongate. *Plangiodes* has frontogenal carinae and is very similar to *Eurycorypha* in most other characters, but has narrower fastigia. The general appearance is matched by a number of other African genera, especially *Plangia*, but in all these genera the fastigia are narrower and in most of them the pronotum lacks lateral carinae.

In terms of the number of currently valid named species *Eurycorypha* is the largest African genus of Phaneropterinae. Over thirty species have been named and no specific synonymy has yet

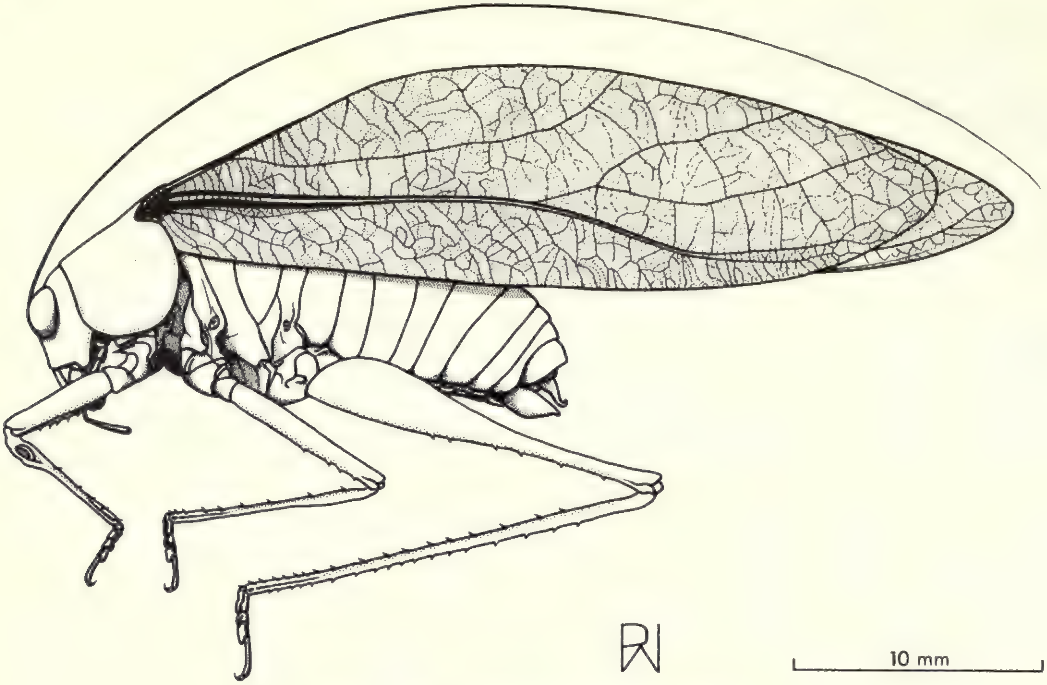


Fig. 206 *Eurycorypha ornatipes*, male.

been established. There are in addition several undescribed species in the BMNH collection, but I have thought it unwise to delay publication of this review by undertaking the full revision that this genus clearly needs. In spite of this relatively large number of species, *Eurycorypha* is a remarkably uniform genus in non-sexual characters. The male genitalia, however, show a wide variety of form, often involving characteristically shaped modifications of the tenth abdominal tergite, and the ovipositor varies in different species from being much reduced (almost to the extent shown by *Catoptropteryx*) to being large and robust.

Although *Eurycorypha* normally has open tympana on each side of the fore tibiae, I have examined a series of *E. ornatipes* from Efulen, Cameroun (on loan from the ANS, Philadelphia), in which there are well developed internal auricles; there is also in the BMNH a specimen of the same species from Tafo, Ghana, in which there are partially developed internal auricles. This unusual intraspecific variation in tympanal structure parallels that shown by *Catoptropteryx aurita* in East Africa (Huxley, 1970: 167–168, figs 12 and 13).

The young nymphs of at least some species of *Eurycorypha* are ant-like in appearance and bear little resemblance to the adults. Some structural modification, especially of the pronotum, together with the predominantly dark brown or black coloration with significantly placed pale markings, make these nymphs look remarkably like ants, and according to Vosseler (1908) the resemblance is enhanced in the living insects by ant-like behaviour. In the species (of uncertain identity) studied by Vosseler the first three nymphal instars were ant-like, the fourth was to some extent transitional, and the fifth and sixth (last) were of quite normal Phaneropterine appearance and mostly green in colour. One of the young *Eurycorypha* nymphs in the BMNH is labelled as being 'associated with *Camponotus acuapimensis*', and this specimen certainly resembles a Camponotine ant.

The assignment of *Orophus compressus* Walker to *Eurycorypha* by Kirby (1906: 462) was incorrect; it is clear from the holotype, which I have examined, that it belongs to *Plangia* and I am therefore here transferring it to that genus (p. 175). Kirby (1906: 465) was also mistaken in considering *Orophus flavescens* Walker to be a senior synonym of *Plangia camerata* Karsch, the type-species of *Corycomima*. I have examined the holotypes (both female) of these two species and have found them to be quite distinct, even at the generic level. The holotype of *flavescens* is best regarded, at least for the time being, as belonging to *Eurycorypha*, and I have therefore added it to the list of included species; it is quite similar to *E. zebrata*, especially in the size, shape and dentation of the ovipositor, but is nevertheless clearly a distinct species.

I am also adding to the list below six species (*kevani, klaptoczi, laticercis, lesnei, meruensis* and *stenophthalmica*) that were inadvertently omitted from my 1968 catalogue. I am, however, still excluding *E. brevipennis* Karsch, *E. brunneri* Brancsik and *E. prasinata* Stål, all described from Madagascar, as I think it probable that they do not occur on the African mainland, although Karsch (1889: 454) records *E. prasinata* from widely scattered African localities; it is even possible that these three names are synonymous.

DISTRIBUTION. The whole of the Afrotropical Region, including the Arabian Peninsula and Madagascar.

INCLUDED AFRICAN AND ARABIAN SPECIES. *E. adicra* Karsch, *E. aequatorialis* Krauss, *E. arabica* Uvarov (with subspecies *E. a. arabica* Uvarov, *E. a. media* Uvarov, *E. a. reducta* Uvarov), *E. brevicollis* Stål, *E. canaliculata* Karsch, *E. cereris* (Stål), *E. cuspidata* Krauss, *E. darlingi* Uvarov, *E. diminuta* Chopard, *E. fallax* (Brunner), *E. flavescens* (Walker) **comb. n.** (see above), *E. kevani* Chopard, *E. klaptoczi* Karny, *E. laticercis* Chopard, *E. lesnei* Chopard, *E. meruensis* Sjöstedt, *E. montana* Sjöstedt, *E. mutica* Karsch, *E. ornatipes* Karsch, *E. proserpinae* Brunner, *E. punctipennis* Chopard, *E. securifera* Brunner, *E. simillima* Chopard, *E. spinulosa* Karsch, *E. stenophthalmica* Chopard, *E. strangulata* (Walker), *E. stylata* Stål, *E. sudanensis* Giglio-Tos, *E. varia* Brunner, *E. velicauda* Karsch, *E. zebrata* Bruner.

OXYGONATIUM gen. n.

Type-species: *Oxygonatium huxleyi* sp. n.

♂. Fastigium of vertex sloping very steeply to frons, much broader than first antennal segment, meeting equally broad fastigium of frons along horizontal line, with median sulcus. Eyes oval and elongate, prominent. Pronotum without lateral carinae, surface slightly punctate or rugose, especially on lateral lobes, matt or slightly shiny. Fore coxae with spine. Femora with ventral spinules; mid femora with dorsal point at tip and hind femora extended into long dorsal apical point. Fore tibiae with open tympanum on each side. Fore and mid tibiae without dorsal spurs except at apex. Mid and hind tibiae swollen near base. Hind tibiae with three apical spurs on each side. Both pairs of wings fully developed. Fore wings slightly shiny and fairly translucent, at least in places; *Sc* and *R* contiguous except near apex. Tenth abdominal tergite unmodified. Subgenital plate with very small styles.

♀ unknown.

DISCUSSION. *Oxygonatium* is clearly a close relative of *Eurycorypha*, sharing with it the general habitus and broad fastigia, but may be readily distinguished from it by the lack of frontogenal carinae, the swollen bases of the mid and hind tibiae, and the conspicuously extended point at the tip of the hind femora.

I take pleasure in naming the only known species of this genus after my colleague John Huxley, who helped me greatly in the early stages of this review.

DISTRIBUTION. Known at present only from the southern forested parts of Ivory Coast and Ghana, but likely also to occur in Sierra Leone and Liberia.

Oxygonatium huxleyi sp. n.

(Figs 203, 205, 207)

♂. Fore femora with about 7–11 ventral spinules. Mid femora with about 10–12 ventral spinules. Hind femora with about 15–19 ventral spinules. Fore tibiae with 5–6 external ventral spurs. Mid tibiae with 8 external ventral spurs. Hind tibiae with about 15–18 external dorsal spines.

Cerci shaped as in Fig. 203. Subgenital plate shaped as in Fig. 205.

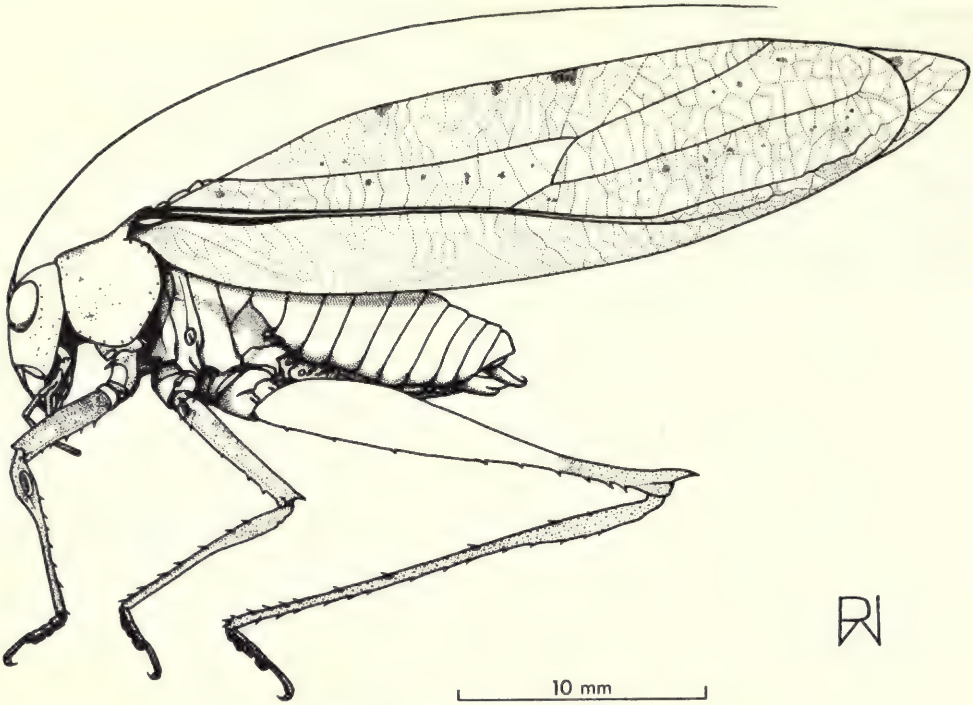


Fig. 207 *Oxygonatium huxleyi*, male.

General coloration green (often yellowish brown in dried specimens), but fore and mid legs, distal third of hind femora, hind tibiae and most of antennae brown. Head with scattered dark brown spots. Pronotum with dark brown spots along margin and brown stripe along each side of disc. Meso- and metathoracic pleura with oblique brown stripe along line of anterior margin of flexed fore wings. Fore wings often with scattered small dark spots, especially in radial area, and usually with one or more larger dark spots near hind margin; hind wings with dark spot near tip. Fore and mid coxae, femora and tibiae, distal third of hind femora, and hind tibiae, pale brown with dark brown spots and mottling. Femoral and tibial spines and spurs dark-coloured or with dark tip. Tarsi dark brown with paler dorsal stripe. Cerci darkened at tip.

♀ unknown.

MEASUREMENTS

	Males
Total length	(5): 36·2–38·9, mean 37·92
Median length of pronotum	(5): 4·4–4·7, mean 4·54
Length of hind femur	(5): 15·8–17·3, mean 16·42
Length of fore wing	(5): 28·4–31·5, mean 29·96

DISCUSSION. If further species of *Oxygonatium* are found, the male genitalia, which are very simple in *O. huxleyi*, may well not be diagnostically useful at the specific level. The colour pattern, however, is very likely to be peculiar to *O. huxleyi*.

MATERIAL EXAMINED

Holotype ♂, **Ghana**: [Eastern Region,] Kade, UV trap, 30.iv.1971 (*Majer*) (BMNH).

Paratypes. **Ghana**: 1 ♂, [Eastern Region,] Kade, UV trap, 1.x.1971 (*Majer*) (BMNH). **Ivory Coast**: 1 ♂, Lamto (Toumodi), at light, 1–15.viii.1968 (*Girard*) (BMNH); 1 ♂, Lamto (Toumodi), at light, 15–30.ix.1968 (*Girard*) (IFAN, Dakar); 1 ♂, Lamto (Toumodi), at light, 19.x.1968 (*Girard*) (IFAN, Dakar).

DISTRIBUTION. As given for the genus.

Check-list of the African and Arabian Phaneropterinae with open tympana

The sequence follows the text exactly, i.e. systematic for the genera, and species of newly revised genera, but alphabetical for the species of genera not revised here. All synonyms are listed, including those based on non-African types. *Diogena,* which has auriculate tympana, is included for reasons explained on p.169.

- ***ATLASACRIS*** Rehn
  - ***peculiaris*** Rehn
- ***IVENSIA*** Bolívar
  - ***uncinata*** Bolívar
  - ***scaura*** **sp. n.**
  - ***longispina*** **sp. n.**
  - ***parva*** **sp. n.**
  - ***breviala*** **sp. n.**
- ***PRONOMAPYGA*** Rehn
  - ***grandis*** Rehn
  - ***graueri*** Rehn
- ***MONTICOLARIA*** Sjöstedt
  - ***kilimandjarica*** Sjöstedt
  - ***meruensis*** Sjöstedt
- ***MERUTERRANA*** Sjöstedt
  - ***elegans*** Sjöstedt
- ***ODONTUROIDES*** **gen. n.**
  - ***plasoni*** (Ebner) **comb. n.**
  - ***jagoi*** **sp. n.**
  - ***insolitus*** **sp. n.**
- ***ODONTURA*** Rambur
  - ***algerica*** Brunner
  - ***borrei*** Bolívar
  - ***brevis*** Werner
  - ***capensis*** Walker
  - ***liouvillei*** Werner
  - ***maroccana*** Bolívar
    - *teknicus* Morales
  - ***microptera*** Chopard
  - ***moghrebica*** Morales
  - ***pulchra*** Bolívar
  - ***quadridentata*** Krauss
    - *terniensis* Finot
  - ***spinulicauda*** Rambur
  - ***stenoxypha*** (Fieber)
  - ***uvarovi*** Werner
- ***DUCETIA*** Stål
    - *Paura* Karsch
    - *Epiphlebus* Karsch **syn. n.**
    - *Pseudisotima* Schulthess
    - *Kuwayamaea* Matsumura & Shiraki
    - *Schubotzacris* Rehn **syn. n.**
    - *Telaea* Bolívar
  - ***biramosa*** (Karsch)
  - ***chelocerca*** Ragge
  - ***costata*** Ragge
  - ***crosskeyi*** Ragge
  - ***crypteria*** (Karsch) **comb. n.**
  - ***fuscopunctata*** Chopard
  - ***levatiala*** **sp. n.**
  - ***loosi*** Griffini
    - *producta* Rehn **syn. n.**
  - ***macrocerca*** Ragge
  - ***parva*** Ragge
  - ***punctata*** (Schulthess)
  - ***punctipennis*** (Gerstaecker)
    - *reticulosa* Karsch
    - *quadripunctata* Bolívar
  - ***ramulosa*** Ragge
  - ***ruspolii*** (Schulthess) **comb. n.**
  - ***sagitta*** Ragge
  - ***vitriala*** Ragge
- ***PEROPYRRHICIA*** Brunner
  - ***massaiae*** (Bormans)
    - ? *scotti* Uvarov
  - ***antinorii*** (Bormans)
    - *cooperi* Uvarov **syn. n.**
  - ***maculata*** Schulthess
  - ***guichardi*** **sp. n.**
  - ***parva*** **sp. n.**
- ***CORYMETA*** Brunner
  - ***amplectens*** (Schaum)
- ***MILITITSA*** Burr
  - ***somaliensis*** Burr
- ***TROPIDONOTACRIS*** Chopard
  - ***amabilis*** Ragge
  - ***carinata*** Chopard
  - ***grandis*** Ragge
- ***PARDALOTA*** Brunner
  - ***asymmetrica*** Karsch
  - ***haasi*** Griffini
  - ***karschiana*** Enderlein
  - ***reimeri*** La Baume
  - ***superba*** Sjöstedt
  - ***versicolor*** Brunner
- ***POECILOGRAMMA*** Karsch
  - ***annulifemur*** Karsch
  - ***cloetensi*** (Griffini) **comb. n.**
  - ***striatifemur*** Karsch
- ***KEVANIELLA*** Chopard
  - ***bipunctata*** Chopard
- ***CATOPTROPTERYX*** Karsch
  - ***afra*** (Karsch)
  - ***ambigua*** Huxley
  - ***apicalis*** (Bolívar)
    - *signatipennis* Karsch
  - ***aurita*** Huxley
  - ***capreola*** Karsch
    - *immaculipennis* Karsch
  - ***extensipes*** Karsch
  - ***guttatipes*** Karsch
  - ***naevia*** Huxley
  - ***nanus*** Huxley
  - ***neutralipennis*** Karsch
  - ***nigrospinosa*** (Brunner)
  - ***occidentalis*** Huxley

punctulata (Karsch)
    maculipennis Karsch
ramulosa Huxley
serrifera Huxley
PHANEROPTILA Uvarov
insularis Uvarov
DIONCOMENA Brunner
ornata Brunner
    superba Karsch **syn. n.**
tanneri **sp. n.**
zernyi **sp. n.**
jagoi **sp. n.**
bulla **sp. n.**
grandis **sp. n.**
nitens **sp. n.**
GABONELLA Uvarov
    Gabonia Bolívar
cothurnata (Bolívar)
    feana Griffini **syn. n.**
SCOLOCERCA **gen. n.**
fusciala **sp. n.**
PHANEROPTERA Serville
    Dannfeltia Sjöstedt **syn. n.**
    Anerota Caudell
    Paranerota Karny
    Euanerota Karny
acaciae Chopard
albida Walker
fragilis Ragge
gracilis Burmeister
    roseata Walker
    marginalis Brunner
    indica Brunner
    elongata Brunner
    subcarinata Bolívar
    spinosa Bei-Bienko
longispina Ragge
maculosa Ragge
magna Ragge
minima Brunner
nana Fieber
    quadripunctata Brunner
nigropunctata Chopard
parva Ragge
sparsa Stål **stat. rev.**
    lurida Walker
    tetrasticta Gerstaecker
    conspersa Stål
    punctulata Burr
    nana Sjöstedt **syn. n.**
    tenuicerca Ramme
    bivittata Bei-Bienko
    africana Steinmann **syn. n.**
EULIOPTERA Ragge
reticulata reticulata (Brunner)
reticulata leptomorpha Ragge
reticulata planilima **subsp. n.**
disparidens **sp. n.**
umbilima **sp. n.**
crosskeyi **sp. n.**
flexilima **sp. n.**
longicerca Ragge
insularis **sp. n.**
atkinsonae **sp. n.**
clavigera **sp. n.**
monticola **sp. n.**
montana **sp. n.**
incisa **sp. n.**
bilobata **sp. n.**
spinulosa Ragge
breviala Ragge
zanzibarica (Brunner) **comb. n.** (nomen dubium, see p. 138)
MELIDIA Stål
brunneri Stål
kenyensis Chopard
laminata Chopard
PARAPYRRHICIA Brunner
zanzibarica Brunner
acutilobata **sp. n.**
PLEOTHRIX **gen. n.**
conradti (Bolívar) **comb. n.**
DITHELA Karsch
acuticercus Sjöstedt
rectiloba Karsch
BUEACOLA Sjöstedt
cornigera Sjöstedt
ECTOMOPTERA **gen. n.**
nepicauda **sp. n.**
EURYASTES **gen. n.**
jagoi **sp. n.**
TERPNISTRIA Stål
lobulata Stål
zebrata (Serville)
DIOGENA Brunner
denticulata Chopard
fausta (Burmeister)
TROPIDOPHRYS Karsch
amydra Karsch
TERPNISTRIOIDES **gen. n.**
tuberculatus (Chopard) **comb. n.**
GELATOPOIA Brunner
bicolor Brunner
TRIGONOCORYPHA Stål
angustata Uvarov
tihamae Uvarov
SYMMETROPLEURA Brunner
    Cameronia Karsch
africana Brunner
plana (Walker)
    latipennis Chopard
CORYCOMIMA Karsch
camerata (Karsch) **nom. rev.**
PLANGIA Stål
compressa (Walker) **comb. n.**
graminea deminuta Griffini
graminea graminea (Serville)
    natalensis Walker

karschi Chopard
laminifera Karsch
nebulosa Karsch
unimaculata Chopard
villiersi Chopard
MONTEIROA Karsch
latifrons Karsch
***nigricauda* sp. n.**
PLANGIODES Chopard
carinatus Chopard
EURYCORYPHA Stål
Myrmecophana Brunner
adicra Karsch
aequatorialis Krauss
arabica arabica Uvarov
arabica media Uvarov
arabica reducta Uvarov
brevicollis Stål
canaliculata Karsch
cereris (Stål)
cuspidata Krauss
darlingi Uvarov
diminuta Chopard
fallax (Brunner)
flavescens (Walker) **comb. n.**
kevani Chopard
klaptoczi Karny
laticercis Chopard
lesnei Chopard
meruensis Sjöstedt
montana Sjöstedt
mutica Karsch
ornatipes Karsch
proserpinae Brunner
punctipennis Chopard
securifera Brunner
simillima Chopard
spinulosa Karsch
stenophthalmica Chopard
strangulata (Walker)
stylata Stål
sudanensis Giglio-Tos
varia Brunner
velicauda Karsch
zebrata Bruner
OXYGONATIUM **gen. n.**
***huxleyi* sp. n.**
PSEUDOPYRRHIZIA Brunner
punctata Brunner (nomen dubium, see p. 68)

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The ant tribe Tetramoriini (Hymenoptera: Formicidae)

The genus *Tetramorium* Mayr in the Ethiopian zoogeographical region

Barry Bolton

Entomology series Vol 40 No 3 31 July 1980

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Barry Bolton

Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD

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Synopsis

The ant genus *Tetramorium* (= *Xiphomyrmex*, = *Macromischoides*, = *Atopula*, = *Tetrogmus*, = *Lobomyrmex*, = *Sulcomyrmex*) is revised for the Ethiopian zoogeographical region. A key is presented for identification of the worker caste of the 176 presently recognized species, and a provisional key has been drawn up for the 19 species-groups into which the genus is divided. Sixty-four species are described as new and seven species are excluded from the genus. Eighty-nine synonyms are established, mostly of former infraspecific forms. New status as valid species has been given to 34 former infraspecific taxa. One replacement name is proposed.

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Introduction

This is the fourth paper in a series dealing with the taxonomy of the tribe Tetramoriini. The first part (Bolton, 1976) dealt with the definition of the tribe and of its constituent genera, reviewed or revised the smaller genera and presented a full revision of *Triglyphothrix*. Subsequent parts have been concerned with a taxonomic revision of the large genus *Tetramorium* itself. The second part of the study (Bolton, 1977) dealt with the Oriental, Indo-Australian and Australasian faunas of *Tetramorium*, and in the third part (Bolton, 1979) the Malagasy and New World species were revised.

With the completion of this present part, representing the fauna of the Ethiopian zoogeographical region, all of the genus has been revised except for the Palaearctic members of the *caespitum*-group, endemic in that region. As this last-named group is at present undergoing formal revision by Dr Bruno Poldi of Mantova it is not planned to include it in this series, but a definition of the group and discussion of species belonging to it which occur outside the Palaearctic has been included in various parts of this revisionary series.

The fauna of the Ethiopian region contains more endemic species of *Tetramorium* than the rest of the world together, the number presently recognized standing at 176. This is compared to 77 in the Oriental plus Indo-Australian, 17 in Australia, 29 Malagasy, 25 Palaearctic (approximate number of species in *caespitum*-group), and 4 Nearctic, giving a total of about 328 valid species in the genus as a whole. Considering all the genera of the tribe it can be seen that *Tetramorium* is by far the largest.

Genus	Number of species
Tetramorium	328
Triglyphothrix	55
Strongylognathus	22
Rhoptromyrmex	7
Decamorium	2
Anergates	1
Teleutomyrmex	1
Total	416

The majority of *Tetramorium* species are terrestrial, nesting in rotten wood or directly into the earth, the latter often under grass or leaf litter but frequently also in exposed or directly insolated sites. Less commonly, some species are completely subterranean, some nest under the bark of standing trees and a few nest in rot-holes in tree trunks or in other cavities in plants. A few species (*aculeatum*-group) are truly arboreal and make fibrous nests attached to the tree or to its leaves.

Most species in the genus are active predators or scavengers and a few feed extensively, or perhaps solely, on other ants. Numerous species will tend aphids or coccids if the opportunity arises but this is generally as a supplement to the diet rather than the main preference. Diverging widely from this, one group (*solidum*) has a radically different food supply – grass seeds, and because of this diet bears a striking superficial resemblance to species from other granivorous genera such as *Messor, Pogonomyrmex* and *Ephebomyrmex*. The *oculatum*-complex of the *simillimum*-group is built on similar lines to *solidum* and its allies, though smaller in size, and these may also be granivorous.

The *Tetramorium* fauna of the Ethiopian zoogeographical region has not previously been monographed. The only attempt at synthesizing any part of the fauna was that of Arnold (1917; 1926) who presented a review with keys and descriptions of the fauna of southern Africa. Although this was a very good attempt for its time, and was refreshingly different from the proliferation of names being perpetrated by Santschi and others, it is now somewhat out of date and difficult to use.

Measurements and indices

Total Length (TL). The total outstretched length of the individual, from mandibular apex to gastral apex.

Head Length (HL). The length of the head proper, excluding the mandibles, measured in a straight line from the anteriormost point of the median clypeal margin to the mid-point of the occipital margin, in full-face view. (In species with strongly concave occipital margin the head length is measured to the mid-point of a line connecting the posterolateral projections.)

Head Width (HW). The maximum width of the head behind the eyes, measured in full-face view.

Cephalic Index (CI).
$$\frac{\mathrm{HW} \times 100}{\mathrm{HL}}$$

Scape Length (SL). The straight-line length of the antennal scape excluding the basal constriction or neck close to the articulating condylar bulb.

Scape Index (SI).
$$\frac{\mathrm{SL} \times 100}{\mathrm{HW}}$$

Pronotal Width (PW). The maximum width of the pronotum in dorsal view.

Alitrunk Length (AL). The diagonal length of the alitrunk in lateral view from the point at which the pronotum meets the cervical shield to the posterior base of the metapleural lobes or teeth.

All measurements are expressed in millimetres.

Abbreviations of museums

AM, Grahamstown	Albany Museum, Grahamstown, Cape Province, South Africa.
AMNH, New York	American Museum of Natural History, New York, U.S.A.
BMNH	British Museum (Natural History), London, U.K.
CAS, San Francisco	California Academy of Sciences, San Francisco, California, U.S.A.
IE, Bologna	Istituto di Entomologia dell'Università, Bologna, Italy.
MCSN, Genoa	Museo Civico di Storia Naturale 'Giacomo Doria', Genoa, Italy.
MCZ, Cambridge	Museum of Comparative Zoology, Cambridge, Massachusetts, U.S.A.
MHN, Geneva	Muséum d'Histoire Naturelle, Geneva, Switzerland.
MNHN, Paris	Muséum National d'Histoire Naturelle, Paris, France.
MNHU, Berlin	Museum für Naturkunde der Humboldt-Universität, Berlin, Germany (D.D.R.).
MRAC, Tervuren	Musée Royal de l'Afrique Centrale, Tervuren, Belgium.
NM, Basle	Naturhistorisches Museum, Basle, Switzerland.
NM, Bulawayo	National Museum, Bulawayo, Rhodesia.
NM, Vienna	Naturhistorisches Museum, Vienna, Austria.
SAM, Cape Town	South Africa Museum, Cape Town, South Africa.
USNM, Washington	United States National Museum (National Museum of Natural History), Washington, D.C., U.S.A.

Diagnosis of *Tetramorium*

TETRAMORIUM Mayr

Tetramorium Mayr, 1855: 423. Type-species: *Formica caespitum* L., 1758: 581; by subsequent designation of Girard, 1879: 1016.

Tetrogmus Roger, 1857: 10. Type-species: *Tetrogmus caldarius* Roger, op. cit.: 12; by monotypy. [Synonymy by Roger, 1862: 297; Mayr, 1863: 456.]

Xiphomyrmex Forel, 1887: 385 [as subgenus of *Tetramorium*]. Type-species: *Tetramorium* (*Xiphomyrmex*) *kelleri* Forel, loc. cit.; by subsequent designation of Wheeler, 1911: 175. [Synonymy by Bolton, 1976: 359.]

Atopula Emery, 1912: 104. Type-species: *Atopomyrmex nodifer* Emery, 1901: 115; by original designation. [Synonymy by Bolton, 1976: 359.]

Macromischoides Wheeler, 1920: 53. Type-species: *Macromischa aculeata* Mayr, 1866: 507; by original designation. [Synonymy by Bolton, 1976: 359.]

Sulcomyrmex Kratochvíl, 1941: 84 [as subgenus of *Tetramorium*]. [Proposed without designation of type-species; name not available.]

Lobomyrmex Kratochvíl, 1941: 84 [as subgenus of *Tetramorium*]. Type-species: *Tetramorium* (*Lobomyrmex*) *ferox silhavyi* Kratochvíl, loc. cit. [= *Tetramorium ferox* Ruzsky, 1903: 309], by monotypy. [Synonymy by Bolton, 1976: 359.]

Diagnosis of worker and female. Myrmicine ants of the tribe Tetramoriini which have the following combination of characters. Mandibles with 2–3 enlarged apical teeth followed by a row of 4 (rarely more) denticles, so that at least 6 (usually 7) teeth are present altogether. Sting with an apical or apicodorsal translucent lamelliform appendage which may be spatulate, triangular, dentiform or pennant-shaped. Lateral portions of clypeus raised into a sharp ridge or shielding wall in front of the antennal insertions. Palp formula 4, 3 at maximum. (Usually with this count, very rare reductions to 4, 2; 3, 3 and 3, 2 are known.) Antennae with 11 or 12 segments, with an apical club of 3 segments. Body hairs never regularly branched bifid, trifid or quadrifid, usually simple but sometimes absent or bizarre.

Diagnosis of male. Myrmicine ants of the tribe Tetramoriini which have the following combination of characters. Mandibles dentate. Antennae with 10–11 segments, the second funicular an elongate fusion-segment; funiculus filiform. Palp formula 4, 3 at maximum as worker/female. Body hairs as worker/female, never regularly branched. A fuller definition of the genus has been given previously (Bolton, 1976) along with a discussion of the genus-level synonymy of *Tetramorium* outlined above.

Three other tetramoriine genera occur in the Ethiopian zoogeographical region beside *Tetramorium*, but the number of species in these genera is much lower. They are *Triglyphothrix* (33 species), *Rhoptromyrmex* (4 species) and *Decamorium* (2 species), as compared with the 176 known species of *Tetramorium*.

The Tetramoriini of the Ethiopian region may be defined as myrmicine ants having the following 4 characters in combination in workers and females:

1, dentition of 2–3 teeth apically, followed by a row of 3–7 denticles; never with a graded series of teeth and never with fewer than 6 teeth (usually with 7);
2, palp formula never exceeding 4, 3;
3, sting with an apical or apicodorsal lamelliform appendage of varying shape;
4, anterolateral portions of clypeus raised into a ridge or shielding wall in front of the antennal insertions.

The workers of the four myrmicine genera showing this combination of characters may be keyed as follows for the Ethiopian region.

1 Some or all dorsal surfaces of head and body equipped with branched hairs which may be bifid, trifid or quadrifid; simple hairs often also present . . . . ***TRIGLYPHOTHRIX*** Forel
– Dorsal surfaces of head and body without bifid, trifid or quadrifid hairs; simple hairs usually present but some species with bizarre pilosity and some hairless 2
2 Antennae with 10 segments . . . . ***DECAMORIUM*** Forel
– Antennae with 11–12 segments 3
3 Palp formula 3,2. Head heart-shaped and median portion of clypeus with a prominent arcuate anterior margin which overlaps the basal angle of the mandible; propodeum usually unarmed ***RHOPTROMYRMEX*** Mayr
– Palp formula usually 4, 3, very rarely reduced but if 3, 2 then head not heart-shaped and median portion of clypeus without a prominent arcuate anterior margin; propodeum usually bispinose ***TETRAMORIUM*** Mayr

Fuller keys to the tetramoriine genera and species-level keys to *Triglyphothrix, Rhoptromyrmex* and *Decamorium* are given in Bolton (1976).

As defined above *Tetramorium* is a fairly compact large genus, distributed throughout the Ethiopian zoogeographical region in all zones except extreme desert. The characters noted in the definition will successfully isolate the genus from all others but some other characters deserve mention as they are of importance in the species-level and species-group-level taxonomy of the genus as a whole.

The antennae always have a well-defined 3-segmented apical club, but the number of antennomeres may vary, 11 or 12 being present. This character was originally used to separate *Xiphomyrmex* (with 11) from *Tetramorium* (with 12), but it has been found to have no significance as the reduced count occurs in a number of widely divergent species-groups whilst other characters of generic significance remain fixed throughout those groups and throughout groups with 12-merous antennae. For a case in point see the discussion of the *weitzeckeri*-group in this paper.

Dentition of the mandibles is usually of 3 enlarged apical teeth followed by 4 smaller denticles, giving a total count of 7 teeth altogether. Variation from this is usually by increasing the denticle row to as many as 7, so that 10 teeth may sometimes be present. This increase in teeth is not a characteristic of any particular group but occurs in isolated species throughout the genus. Reduction in number of teeth is less common, the lowest count being 6, either by loss of one of the larger apical teeth or by suppression of one of the denticles.

The palp formula count of 4, 3 (maxillary palp 4-segmented; labial palp 3-segmented) is overwhelmingly predominant in the genus as a whole. In the Ethiopian region the following reductions are known: 4, 2 (*africanum*); 3, 3 (*muralti*); and 3, 2 (*aculeatum*). Some of the more minute species, for instance in the *convexum*- and *shilohense*-group, may also have a reduced count, but shortage of material at present precludes dissection of these forms. It was pointed out earlier (Bolton, 1976) that the reduced count of 3, 2 was the sole basis for separating *Macromischoides* (as then constructed) from *Tetramorium*. The strength of this character was undermined by the fact that *africanum*, of the same species-group (and so close to *aculeatum*, the type-species, that Wheeler (1922) regarded it as 'hardly more than a subspecies of *aculeata*'), had a count of 4, 2. This was sufficient to sink *Macromischoides*, but since then the discovery of *rimytyum* has confirmed the synonymy as this species forms an almost perfect intermediate between *africanum* and *aculeatum* on the one hand, and *metactum* and *youngi* (of the *setigerum*-group) on the other, and clearly points out the origins of the species formerly placed in *Macromischoides*. To drive in the final nail, *rimytyum* appears to have the usual 4, 3 palp formula (based on an *in situ* count).

The median portion of the clypeus presents a couple of useful characters. The first of these, presence/absence of a median notch, is usually stable at species-group level, all species in any particular group either having or lacking the feature. However, in species-groups in which the notch is present it may be about equally developed in all species (*bicarinatum*-group, *camerunense*-group) or may vary from a small impression to an enormous excavation of the margin (*solidum*-group). The second character is the median carina of the clypeus which is present in most species of the genus but is reduced or lost in a few.

Eyes are present in all known *Tetramorium* and are usually of moderate size (in the range 0·20–0·27 × HW). However, the *shilohense*-group has specialized in reduced eyes, sometimes down to a single ommatidium but always with the maximum diameter $< 0{\cdot}17 \times$ HW. This is paralleled by a few species from other groups such as *semireticulatum* (*capense*-group) and *pauper* (*simillimum*-group). In the other direction the largest eyes in the genus are found in *oculatum* (0·37 × HW or more) but a number of species have them $> 0{\cdot}28 \times$ HW. Although large eyes are not truly characteristic of a single species-group most members of the *bicarinatum*- and *setigerum*-groups and of the *oculatum*-complex of the *simillimum*-group have them.

The degree of development of frontal carinae and antennal scrobes is to some extent linked with the relative lengths of the scapes and these characters together are useful in defining a number of species-groups. In general, forms with long antennal scapes ($SI > 100$, i.e. $SL > HW$) tend to have short or reduced frontal carinae and to lack antennal scrobes, whereas forms with shorter scapes ($SI < 100$, i.e. $SL < HW$) tend to have elongate strong frontal carinae and fairly well to very strongly developed scrobes. In the first category come the *sericeiventre*- and *aculeatum*-groups, and part of the *setigerum*-group. In the second come the vast majority of the remaining groups. There are of course numerous intermediate grades and in some groups (that of *simillimum* for instance) all grades of carinal development and a wide range of scrobal forms are seen, whilst all the species have SI < 100. There are a number of glaring exceptions to this oversimplified picture. The *solidum*-group, for example, lacks any trace of scrobes or frontal carinae behind the frontal lobes, but has short antennae. The *flabellum*-group has some species (*flabellum*-complex) with long frontal carinae and long scapes, as is also the case in some members of the *setigerum*-group. The provisional key to species-groups and diagnoses of the groups will indicate the values of these characters either alone or in combination within the genus.

The condition of the tibial spurs of the mid and hind legs is one of the long-used characters in myrmicine classification at both tribal and generic levels, and the differences between spurs pectinate-/simple-/absent have been considered of prime importance in the past. Brown (1963) has pointed out the effects of overreliance on this character in the Ponerinae and the time has now come to seriously question its value in the Myrmicinae. Traditionally any myrmicine with pectinate spurs was placed in the tribe Myrmicini (Wheeler 1922: 655), whilst those with simple to absent spurs were scattered elsewhere. To point out how this simplistic approach has been eroded one need only turn to the genus *Myrmica* itself, type-genus of its tribe, and always previously defined as having pectinate spurs. In the majority of species this is the case but *M. rugiventris* (M. R. Smith) has only minute barbs on the spurs; *M. bibikoffi* Kutter has the spurs very reduced, at most minutely barbulate but some appearing smooth; *M. arnoldii* Dlussky has the spurs simple and so reduced as to be virtually indistinguishable from the surrounding pilosity.

Next, the genus *Messor* was originally defined as having simple spurs, and was placed in tribe Pheidolini. When a species with finely pectinate spurs was discovered (*Messor regalis* (Emery)) it was immediately made the type of a new genus (*Cratomyrmex*) and placed in the Myrmicini despite the fact that it was otherwise indistinguishable from other *Messor* species. The closest relative of *regalis* was then discovered (*cephalotes* Emery) and this was unhesitatingly placed in *Messor* as its spurs did not have any obvious pectination.

These two examples serve to illustrate what can happen by overreliance on a single, intrinsically variable, character. Must we create a separate genus for any odd species which will not fit into a preconceived system, as the case of *Messor regalis*? (If so we need a generic name to hold the 3 *Myrmica* (at least) whose spurs are not 'normal' for the genus.) Or should we, as has happened in *Myrmica*, be rather more conservative and recognize a need to redefine genera when characters once thought absolute turn out in fact to be gradient or variable, especially when other features of generic significance remain consistent? My support is firmly for the latter as it tends in the long run to produce better-defined genera.

As far as *Tetramorium* is concerned no species have spurs as strongly pectinate as is usual in *Myrmica*, but several have barbulate spurs and many have thick simple spurs. From these there is a finely graded sequence of reduction wherein the spurs become finer and less and less easily distinguishable from the surrounding pilosity, until they disappear.

The presence of a lamelliform appendage on the sting, situated apically or apicodorsally, was shown to be of prime importance (Bolton, 1976) in the definition of tribe Tetramoriini, and was instrumental in the synonymizing of *Xiphomyrmex*. Since this publication a study of the myrmicine sting apparatus has been concluded by Kugler (1978) which investigates the sting structure in more detail and which, incidentally, supports the synonymy.

Pilosity in African *Tetramorium* is usually of simple hairs, which are fine or stout, and acute or blunt apically. However, a number of species in widely divergent groups have lost all dorsal pilosity (which is perhaps to be expected in a genus of this size) and, more interestingly, a few species have developed bizarre and very characteristic hairs whose functions cannot even be guessed at. These very specialized hairs may be appressed, broad, glittering and silvery (*setuliferum* and allies), scale-like or leaf-like (*diomandei* and allies), fan-like (*flabellum*), pectinate or pinnate (*pinnipilum*), clavate (*rogatum*) or plumose (*plumosum*).

Most species have elongate hairs on some or all dorsal surfaces and in the majority of cases these are acute apically. A few groups, however, have specialized partially or entirely in blunted or apically truncated hairs (*simillimum*-group; *setigerum*-group).

Species excluded from *Tetramorium*

Species originally described in *Tetramorium* (or its junior synonym *Xiphomyrmex*) and removed prior to this study.

Tetramorium ericae Arnold, 1917: 332. Transferred to genus *Triglyphothrix* Forel [junior synonym of *Tr. paupera* Santschi] by Bolton, 1976: 333.

Tetramorium simoni Emery, 1895: 35. Transferred to genus *Tetramyrma* Forel by Emery, 1922: 291 [see also Bolton, 1976: 291].

Tetramorium* (*Leptothorax*?) *innocens Forel, 1913*a*: 317. Transferred to genus *Leptothorax* Mayr by Forel, 1916: 425.

Tetramorium* (*Xiphomyrmex*) *fossulatus Forel, 1910*b*: 428. Transferred to genus *Pristomyrmex* Mayr by Santschi, 1916*b*: 51.

Xiphomyrmex orbiceps Santschi, 1914*a*: 367. Transferred to genus *Pristomyrmex* Mayr by Santschi, 1916*b*: 51 [see also Santschi, 1923; Arnold, 1926].

Xiphomyrmex atomum Santschi, 1914*a*: 370. Transferred to genus *Wasmannia* Forel by Santschi, 1916*a*: 504.

Species newly excluded from *Tetramorium*.

Tetramorium altinode Santschi, 1935: 266, fig. 10. Holotype worker, ZAIRE: Matadi, x.1920 (*L. Burgeon*) (MRAC, Tervuren) [examined]. The holotype worker of this species is a quite ordinary species of *Monomorium* Mayr; the correct combination is thus *Monomorium altinode* (Santschi) **comb. n.** [This name is preoccupied in *Monomorium* by *M. rhopalocerum* var. *altinode* Santschi, 1910*a*: 359 (raised to species by Santschi, 1914*c*: 18). On revision a replacement name must therefore be proposed.]

Species of the Ethiopian region

One-hundred and seventy-six species are presently recognized from the zoogeographical region and all of these with the exception of *bicarinatum* and probably *nautarum* are endemic in the region. *T. bicarinatum* originated in South East Asia but is now a very successful tramp, having been transported over most of the world by human commerce (Bolton, 1977; 1979). In Africa, however, it remains unknown except for a single introduction from Burma into South Africa. *T. nautarum*, a member of the *caespitum*-group, is known from a single collection from Annobon I. and is almost certainly an introduction from S. Europe and a junior synonym of one of the species endemic there.

Apart from these two it has been usual for the Ethiopian region to export *Tetramorium* species rather than to accept them from elsewhere. Two very common tramp species, *simillimum* and *caldarium*, both originate in the region and both are now widespread in the rest of the world.

A couple of African species have spread northwards into the more arid parts of the southern Palaearctic (*sericeiventre, doriae*) and others have colonized part or all of the Malagasy region (*delagoense, humbloti, sericeiventre, quadrispinosum*). A single species native to west and central Africa (*lucayanum*) has successfully established itself in the Caribbean countries and Brown (1958) has pointed out that the fairly common South African *grassii* seems to have established itself in New Zealand.

The following list gives a synonymic synopsis of all the species presently known to occur in the Ethiopian zoogeographical region.

Synonymic list of species

***weitzeckeri*-group**
- ***edouardi*** Forel
- ***flavithorax*** (Santschi) **comb. et stat. n.**
- ***guineense*** (Bernard) **comb. et stat. n.**
- ***humbloti*** Forel
  - *humbloti* var. *pembensis* Forel **syn. n.**
  - *humbloti* var. *victoriensis* Forel **syn. n.**

- ***muralti*** Forel
    - *muralti* var. *trilineata* Santschi **syn. n.**
- ***occidentale*** (Santschi) **comb. n.**
    - *occidentalis* subsp. *akengensis* Wheeler **syn. n.**
    - *insularis* Menozzi **syn. n.**
- ***pinnipilum*** **sp. n.**
- ***rogatum*** **sp. n.**
- ***schoutedeni*** Santschi
- ***sepultum*** **sp. n.**
- ***tersum*** Santschi
    - *kivuense* Stitz **syn. n.**
    - *kivuense* st. *atrinodis* Santschi **syn. n.**
- ***weitzeckeri*** Emery
    - *escherichi* Forel **syn. n.**
    - *ebeninum* Arnold **syn. n.**
    - *weitzeckeri* var. *nigellus* Santschi **syn. n.**
    - *weitzeckeri* subsp. *edithae* Weber **syn. n.**
- ***zonacaciae*** (Weber) **comb. n.**

tortuosum-group

- ***capillosum*** **sp. n.**
- ***tabarum*** **sp. n.**

angulinode-group

- ***angulinode*** Santschi
    - *angulinode* var. *daphnis* Santschi **syn. n.**
    - *papyri* Weber **syn. n.**
    - *humerosum* Bernard **syn. n.**
- ***calinum*** **sp. n.**
- ***chloe*** (Santschi) **comb. et stat. n.**
- ***legone*** **sp. n.**
- ***minusculum*** (Santschi) **comb. n.**
    - *minusculus* subsp. *amen* Weber **syn. n.**
- ***nullispinum*** **sp. n.**
- ***sudanense*** (Weber) **comb. n.**
- ***zapyrum*** **sp. n.**

solidum-group

- ***barbigerum*** **sp. n.**
- ***clunum*** Forel **stat. n.**
- ***dichroum*** Santschi **stat. n.**
- ***galoasanum*** Santschi **stat. n.**
- ***glabratum*** Stitz **stat. n.**
    - *solidum* r. *glabratum* var. *aciculatum* Stitz (unavailable)
    - *rutilum* Prins **syn. n.**
- ***grandinode*** Santschi
    - *grandinode* var. *hopensis* Forel **syn. n.**
- ***jordani*** Santschi
    - *aspinatum* Prins **syn. n.**
- ***peringueyi*** Arnold
- ***pogonion*** **sp. n.**
- ***rufescens*** Stitz **stat. n.**
- ***setuliferum*** Emery
    - *squamiferum* Forel (nomen nudum)
    - *setuliferum* var. *cucalense* Santschi **syn. n.**
    - *setuliferum* var. *triptolemus* Arnold **syn. n.**
- ***signatum*** Emery **stat. n.**
    - *solidum* subsp. *lugubre* Forel **syn. n.**
    - *solidum* var. *grootensis* Forel **syn. n.**
    - *solidum* var. *tuckeri* Arnold **syn. n.**
- ***solidum*** Emery

squaminode-group
- ***akermani*** Arnold
  - *akermani* var. *myersi* Arnold **syn. n.**
- ***do*** Forel
- ***dogieli*** Karavaiev
- ***flaviceps*** Arnold **stat. n.**
  - *squaminode* r. *do* var. *mus* Arnold (unavailable)
- ***frigidum*** Arnold **stat. n.**
  - *akermani* var. *drakensbergensis* Arnold **syn. n.**
- ***jejunum*** Arnold
- ***matopoense*** Arnold
- ***nube*** Weber **stat. n.**
- ***platynode*** **sp. n.**
- ***repentinum*** Arnold
- ***sitefrum*** **sp. n.**
- ***squaminode*** Santschi
- ***umtaliense*** Arnold

grassii-group
- ***grassii*** Emery
  - *grassii* var. *laevigatum* Mayr **syn. n.**
  - *joffrei* Forel **syn. n.**
  - *grassii* var. *simulans* Santschi **syn. n.**
  - *joffrei* var. *algoa* Arnold **syn. n.**
  - *grassii* var. *mayri* Emery **syn. n.**
- ***plumosum*** **sp. n.**
- ***regulare*** **sp. n.**
- ***titus*** Forel
- ***vexator*** Arnold

bicarinatum-group
- ***amentete*** **sp. n.**
- ***bicarinatum*** (Nylander)
- ***cristatum*** Stitz **stat. n.**
  - *guineense* subsp. *medje* Wheeler **syn. n.**
  - *guinense* [sic] st. *cristatum* var. *ebangense* Santschi (unavailable)
- ***emeryi*** Mayr
  - *emeryi* st. *cristulatum* Forel **syn. n.**
- ***erectum*** Emery **stat. n.**
  - *bacchus* Forel **syn. n.**
- ***gazense*** Arnold **stat. n.**
- ***notiale*** **nom. n.**
  - *guineense* r. *striatum* Arnold (nom. preocc.)
- ***peutli*** Forel **stat. n.**
- ***phasias*** Forel **stat. n.**
  - *guineense* st. *hertigi* Santschi **syn. n.**
- ***pullulum*** Santschi **stat. n.**
  - *uelensis* Santschi **syn. n.**
  - *fernandensis* Menozzi **syn. n.**

setigerum-group
- ***agile*** Arnold
- ***avium*** **sp. n.**
- ***dolichosum*** **sp. n.**
- ***doriae*** Emery
- ***frenchi*** Forel
- ***gracile*** Forel
- ***laevithorax*** Emery
  - *jeanae* Weber **syn. n.**
- ***metactum*** **sp. n.**

- ***parasiticum*** **sp. n.**
- ***perlongum*** Santschi
- ***praetextum*** **sp. n.**
- ***setigerum*** Mayr
  - *setigerum* st. *quaerens* Forel **syn. n.**
  - *setigerum* var. *anteversa* Santschi **syn. n.**
- ***youngi*** **sp. n.**

***shilohense*-group**

- ***amaurum*** **sp. n.**
- ***diomandei*** **sp. n.**
- ***dysderke*** **sp. n.**
- ***intonsum*** **sp. n.**
- ***jugatum*** **sp. n.**
- ***shilohense*** Forel **stat. n.**
- ***somniculosum*** Arnold
- ***subcoecum*** Forel
  - *subcoecum* var. *inscia* Forel **syn. n.**
- ***termitobium*** Emery
- ***traegaordhi*** Santschi
- ***typhlops*** **sp. n.**
- ***warreni*** Arnold

***flabellum*-group**

- ***ataxium*** **sp. n.**
- ***bellicosum*** **sp. n.**
- ***coloreum*** Mayr
  - *humerosum* subsp. *muscicola* Bernard **syn. n.**
- ***flabellum*** **sp. n.**
- ***geminatum*** **sp. n.**
- ***granulatum*** **sp. n.**
- ***invictum*** **sp. n.**
- ***kestrum*** **sp. n.**
- ***postpetiolatum*** Santschi
- ***pylacum*** **sp. n.**
- ***saginatum*** **sp. n.**
- ***sigillum*** **sp. n.**

***simillimum*-group**

- ***altivagans*** Santschi **stat. n.**
  - *simillimum* subsp. *isis* Weber **syn. n.**
- ***anxium*** Santschi **stat. n.**
- ***argenteopilosum*** Arnold
- ***arnoldi*** (Santschi)
  - *incruentatum* Arnold **syn. n.**
- ***berbiculum*** **sp. n.**
- ***bevisi*** Arnold
- ***bothae*** Forel **stat. n.**
  - *guillarmodi* Arnold **syn. n.**
- ***buthrum*** **sp. n.**
- ***caldarium*** (Roger)
  - *pauper* st. *transformans* Santschi **syn. n.**
  - *pusillum* var. *hemisi* Wheeler
  - *antipodum* Wheeler
  - *minutum* Donisthorpe
- ***delagoense*** Forel
  - *simillimum* var. *madecassum* Forel
  - *intextum* Santschi **syn. n.**
  - *intextum* var. *cataractae* Santschi **syn. n.**
  - *zambezium* Santschi **syn. n.**

- ***ghindanum*** Forel **stat. n.**
- ***krynitum*** **sp. n.**
- ***luteolum*** Arnold **stat. n.**
- ***mossamedense*** Forel **stat. n.**
    - *caespitum* subsp. *schultzei* Forel (provisional synonym)
    - *pusillum* st. *mossamedense* var. *tristis* Santschi (unavailable)
- ***nefassitense*** Forel **stat. n.**
- ***nigrum*** Forel **stat. n.**
    - *brevis* Weber **syn. n.**
- ***oculatum*** Forel
- ***pauper*** Forel
- ***poweri*** Forel **stat. n.**
- ***pusillum*** Emery
    - *caespitum* st. *ladismithensis* Forel **syn. n.**
    - *pusillum* var. *tablensis* Forel **syn. n.**
- ***rhetidum*** **sp. n.**
- ***simillimum*** (F. Smith)
    - *parallelum* (F. Smith)
    - *pygmaeum* Emery
    - *simillimum* subsp. *denticulatum* Forel
    - *pusillum* var. *bantouana* Santschi **syn. n.**
    - *simillimum* var. *opacior* Forel
    - *pusillum* var. *exoleta* Santschi **syn. n.**
    - *pusillum* st. *bantuala* var. *breve* Santschi (unavailable)
    - *simillimum* var. *insulare* Santschi
    - *Wasmannia auropunctata* subsp. *brevispinosa* Borgmeier

caespitum-group

- ***nautarum*** Santschi **stat. n.** (provisional)

convexum-group

- ***convexum*** **sp. n.**
- ***wadje*** **sp. n.**

sericeiventre-group

- ***asetyum*** **sp. n.**
- ***bequaerti*** Forel
    - *humile* Santschi **syn. n.**
- ***bulawayense*** Forel **stat. n.**
    - *bequaerti* st. *bruni* Santschi **syn. n.**
    - *bequaerti* r. *bruni* var. *mashona* Arnold (unavailable)
- ***gladstonei*** Forel
- ***hortorum*** Arnold
- ***khyarum*** **sp. n.**
- ***longicorne*** Forel
- ***microgyna*** Santschi
- ***petersi*** Forel **stat. n.**
- ***quadrispinosum*** Emery
    - *blochmannii* var. *montanum* Forel
    - *blochmanni* st. *continentis* var. *eudoxia* Forel (unavailable)
    - *4-spinosum* [sic] st. *elegans* Santschi **syn. n.**
    - *blochmanni* var. *calvum* Stitz **syn. n.**
    - *sericeiventre* var. *repertum* Santschi **syn. n.**
    - *quadrispinosum* r. *beirae* Arnold **syn. n.**
    - *quadrispinosum* r. *otaviensis* Arnold **syn. n.**
    - *quadrispinosum* st. *angolense* Santschi **syn. n.**
    - *quadrispinosum* st. *elegans* var. *benguelense* Santschi (unavailable)
- ***sepositum*** Santschi **stat. n.**
- ***sericeiventre*** Emery
    - *blochmannii* Forel
    - *sericeiventre* var. *debile* Forel **syn. n.**

  - *sericeiventre* subsp. *femoratum* Emery **syn. n.**
  - *neuvillei* Forel **syn. n.**
  - *blochmanni* subsp. *continentis* Forel **syn. n.**
  - *sericeiventre* var. *inversa* Santschi **syn. n.**
  - *blochmanni* var. *nigriventre* Stitz **syn. n.**
  - *sericeiventre* st. *cinnamomeum* Santschi **syn. n.**
  - *sericeiventre* var. *hori* Santschi **syn. n.**
  - *sericeiventre* var. *arenarium* Santschi **syn. n.**
  - *sericeiventre* var. *bipartita* Santschi **syn. n.**
  - *sericeiventre* var. *munda* Santschi **syn. n.**
  - *sericeiventre* var. *jasonis* Santschi **syn. n.**
  - *sericeiventre* var. *vascoi* Santschi **syn. n.**
  - *sericeiventre* var. *gamaii* Santschi **syn. n.**
  - *sericeiventre* st. *femoratum* var. *transversa* Santschi (unavailable)
  - *sericeiventre* st. *femoratum* var. *colluta* Santschi (unavailable)
  - *sericeiventre* st. *inversa* var. *defricta* Santschi (unavailable)
  - *sericeiventre* st. *continentis* var. *platonis* Santschi (unavailable)
  - *sericeiventre* st. *continentis* var. *georgei* Santschi (unavailable)
  - *sericeiventre* var. *vividum* Santschi **syn. n.**
  - *sericeiventre* st. *inversum* var. *evidens* Santschi (unavailable)
  - *sericeiventre* st. *continentis* var. *gladiator* Santschi (unavailable)
  - *sericeiventre* st. *femoratum* var. *kenyense* Santschi (unavailable)
  - *Atopula hortensis* Bernard
- ***xuthum*** **sp. n.**

camerunense-group
- ***amissum*** **sp. n.**
- ***browni*** **sp. n.**
- ***camerunense*** Mayr
- ***gegaimi*** Forel **stat. n.**
- ***hapale*** **sp. n.**
- ***ictidum*** **sp. n.**
- ***lucayanum*** Wheeler
  - *camerunense* var. *waelbroeki* Forel
  - *lucayanum* var. *sexdens* Forel
  - *rectinodis* Menozzi
- ***luteipes*** Santschi
- ***miserabile*** Santschi
- ***tychadion*** **sp. n.**
- ***ubangense*** Santschi **stat. n.**
- ***versiculum*** **sp. n.**

dumezi-group
- ***candidum*** **sp. n.**
- ***dumezi*** **sp. n.**
- ***elidisum*** **sp. n.**
- ***isipingense*** Forel **stat. n.**
- ***jauresi*** Forel
  - *latens* Arnold **syn. n.**
- ***meressei*** Forel
- ***nodiferum*** (Emery)
- ***pialtum*** **sp. n.**
- ***psymanum*** **sp. n.**
- ***qualarum*** **sp. n.**

aculeatum-group
- ***aculeatum*** (Mayr)
  - *wasmanni* Forel **syn. n.**
  - *aculeatum* subsp. *andricum* Emery **syn. n.**
  - *aculeatum* var. *major* Forel **syn. n.**
  - *aculeatum* var. *rubroflava* Forel **syn. n.**

- *aculeatum* st. *andricum* var. *gladiator* Santschi (unavailable)
- *aculeatus* var. *melanogyne* Santschi **syn. n.**
- *aculeatus* var. *pulchellus* Santschi **syn. n.**
- *aculeatus* st. *wasmanni* var. *abdominalis* Santschi (unavailable)
- *aculeatus* st. *militaris* Santschi **syn. n.**
- *zumpti* Santschi **syn. n.**
- *viridis* Weber **syn. n.**
- *aculeatus* r. *inermis* Bernard **syn. n.**

africanum (Mayr)
- *tessmanni* Forel
- *lamottei* Bernard **syn. n.**

rimytyum sp. n.
rotundatum (Santschi) **stat. n.**

capense-group
- **_amatongae_ sp. n.**
- **_capense_** Mayr
  - *braunsi* Forel
  - *popovici* Forel **syn. n.**
- **_dominum_ sp. n.**
- **_lobulicorne_** Santschi
- **_semireticulatum_** Arnold
  - *semireticulatum* var. *politum* Arnold **syn. n.**

quadridentatum-group
- **_longoi_** Forel
- **_magnificum_ sp. n.**
- **_quadridentatum_** Stitz
  - *commodum* Santschi **syn. n.**
- **_simulator_** Arnold
- **_unicum_ sp. n.**
- **_viticolum_** Weber

Key to species (workers)

Note. The worker caste is unknown in the parasitic species *microgyna* and *parasiticum* and remains undiscovered in *rotundatum*. *T. sudanense* is omitted due to lack of sufficient data (p. 241).

1 Antennae with 11 segments 2
– Antennae with 12 segments 24

2 Mandibles smooth and shining, with scattered small pits 3
– Mandibles distinctly longitudinally striate or rugulose 15

3 Strongly bicoloured species with head and gaster black, alitrunk and appendages clear pale yellow. (Ivory Coast, Ghana, Nigeria) . . . . **_flavithorax_** (p. 226)
– Colour uniform or sometimes the gaster lighter or darker in shade than the alitrunk, but never bicoloured black and yellow as above. 4

4 Promesonotal dorsum smooth, unsculptured except for a few minute pits or rarely with a few faint, very short rugulae on the extreme anterior pronotum. Petiole more or less squamiform in profile (Fig. 5) 5
– Promesonotal dorsum sculptured, usually strongly so but if weak then petiole nodiform in profile 6

5 Dorsum of head with 3 carinae running its length, the median and one on each side of it, between the median and the frontal carinae. Propodeal dorsum with a pair of weak carinae arising from the base of the spines and running forward onto the posterior mesonotum. (Ivory Coast, Ghana, Cameroun) . . . . **_muralti_** (p. 229)
– Dorsum of head with only the median carina running its length (Fig. 1). A lateral carina on each side of the median may be faintly present to the level of the eyes. Propodeal dorsum without

carinae arising at the base of the spines, completely smooth. (Ivory Coast, Ghana, Cameroun, Principe I., Zaire, Angola) ***occidentale*** (p. 229)

6 Larger species with HW $>$ 0·85, SL $>$ 0·65 7

– Smaller species with HW $<$ 0·80, SL $<$ 0·60 8

7 Maximum diameter of eye 0·26 at HW 0·88 so that diameter of eye is about 0·29 × HW (Fig. 4). Sides of head behind eyes without a series of suberect, freely projecting hairs in full-face view. (Zaire, Kenya, Tanzania, Ethiopia) ***tersum*** (part) (p. 232)

– Maximum diameter of eyes 0·19 at HW 0·88 so that diameter of eye is about 0·21 × HW. Sides of head behind eyes with numerous suberect, freely projecting hairs in full-face view. (Zaire) ***schoutedeni*** (p. 231)

8 Propodeum unarmed, without spines or teeth. (Nigeria). ***nullispinum*** (p. 241)

– Propodeum armed with a pair of spines or teeth 9

9 Basal quarter to one-half of first gastral tergite densely shagreened and opaque, this sculpture strong and very distinctive, sometimes appearing as minute striolae due to alignment of the punctulae. (Ghana, Nigeria) ***legone*** (p. 240)

– Basal quarter to one-half of first gastral tergite smooth or at most with a narrow band of coarse, separated punctures immediately behind the postpetiole 10

10 Dorsal (outer) surfaces of mid and hind tibiae and leading edges of scapes with abundant long, fine erect hairs. Postpetiole in profile truncate posteriorly (Fig. 14). (Zaire) ***tabarum*** (p. 236)

– Dorsal (outer) surfaces of mid and hind tibiae and leading edges of scapes without erect long hairs, with short pubescence only. Postpetiole in profile not truncate posteriorly 11

11 Dorsal surfaces of alitrunk blanketed by a dense, very coarse and very conspicuous punctate ground-sculpture between the rugae, the entire surface dull and granular. (Ghana, Nigeria) ***calinum*** (p. 239)

– Dorsal surfaces of alitrunk rugulose or rugose, sometimes with faint punctulation between them but this by no means dominating the sculpture; surface shining 12

12 Petiole and postpetiole dorsally completely unsculptured and shining. Promesonotum with only a few widely spaced longitudinal rugulae. (Sudan, Ivory Coast, Ghana, Cameroun) ***minusculum*** (p. 240)

– Petiole and postpetiole dorsally with sculpture on one or both segments. Promesonotum with dense rugulae or a rugoreticulum 13

13 Dorsal surfaces of both petiole and postpetiole completely covered by a dense, coarse irregular rugosity or a narrow-meshed rugoreticulum, the spaces between which are usually filled with coarse punctulation so that the surfaces of both segments are matt and have a very rough appearance. (Liberia, Ivory Coast, Ghana, Nigeria, Gabon) ***zapyrum*** (p. 242)

– Dorsal surfaces of petiole, postpetiole or both either with a loose open fine reticulum with shining spaces or with sculpture reduced on one or both segments so that open shining spaces are present 14

14 In profile the length of the postpetiole node distinctly less than the length of the petiole node (Fig. 18). (Rhodesia) ***chloe*** (p. 239)

– In profile the length of the postpetiole node equal to or greater than the length of the petiole node (Fig. 17). (Sudan, Ghana, Nigeria, Congo, Zaire, Rhodesia, Botswana) ***angulinode*** (p. 237)

15 First gastral tergite with sparse appressed fine pubescence but without hairs of any description 16

– First gastral tergite with or without pubescence but always with hairs, usually erect or suberect, more rarely reclinate or appressed 17

16 Dorsal alitrunk rugulose and with numerous erect hairs. (Swaziland) ***sepultum*** (p. 232)

– Dorsal alitrunk unsculptured or with superficial punctulation, never rugulose. Hairs usually absent from dorsal alitrunk but rarely with one pair each on pronotum, mesonotum and propodeum at most (Fig. 9). (Zaire, Tanzania, Rhodesia, South West Africa, South Africa, Comoro Is.) ***humbloti*** (p. 228)

17 Some or all of the long curved hairs on the dorsal alitrunk, pedicel and gaster strongly pectinate or pinnate in their apical halves, more rarely with a few plumose hairs also present (Fig. 6). (Angola) ***pinnipilum*** (p. 230)

– Long curved hairs on dorsal alitrunk, pedicel and gaster simple or thickened or blunted apically, never pectinate or pinnate in their apical halves 18

18 Petiole strongly squamiform (Figs 7, 8); the nodes of the pedicel unsculptured . . . 19

– Petiole not squamiform (Figs 10–13); petiole, postpetiole or both sculptured laterally and dorsally, the sculpture usually distinct, rarely faint 20

19 Node of postpetiole as strongly or more strongly squamate than node of petiole so that in profile the postpetiole node is equal to or narrower than the width of the petiole (Fig. 8). Spaces between rugae on head not filled with coarse reticulate-puncturation. (Ethiopia, Sudan, Tanzania, Zaire, Gabon, Angola, Zambia, Rhodesia, Swaziland, South Africa) . ***weitzeckeri*** (p. 233)

– Node of postpetiole rounded-nodiform in profile, thicker than the petiole and tapering dorsally (Fig. 7). Spaces between rugae on head packed with coarse reticulate-puncturation. (Guinea, Liberia, Ivory Coast, Ghana, Nigeria, Gabon, Zaire) . . . . . ***guineense*** (p. 227)

20 Dorsal (outer) surfaces of hind tibiae with abundant erect or suberect long hairs, the longest of which exceed the maximum width of the tibia. Petiole strongly nodiform (Fig. 13), the dorsal length of the node in profile greater than the height of the tergal portion. (Gabon) . . ***capillosum*** (p. 236)

– Dorsal (outer) surfaces of hind tibiae with short hairs which are much shorter than the maximum width of the tibia. Petiole high nodiform (Figs 10–12), the dorsal length of the node in profile less than the height of the tergal portion 21

21 Hairs on first gastral tergite dorsoventrally flattened and reclinate to appressed. (Sudan, Uganda, Ruanda, Zaire) . . . . ***zonacaciae*** (p. 234)

– Hairs on first gastral tergite not dorsoventrally flattened, erect or suberect 22

22 Hairs on first gastral tergite (and elsewhere) very numerous, clavate or strongly expanded apically (Fig. 10). (Angola). . . . . ***rogatum*** (p. 231)

– Hairs on first gastral tergite (and elsewhere) sparse, acute or blunted apically but not clavate or expanded apically, either narrowing apically or approximately the same thickness throughout their length. 23

23 Larger species, HW 0·88–0·98; SI 72–80. Node of petiole in dorsal view broader than long, unsculptured or at most with feeble shallow rugulation. (Ethiopia, Kenya, Tanzania, Zaire) ***tersum*** (part) (p. 232)

– Smaller species, HW 0·76–0·88; SI 83–87. Node of petiole in dorsal view as long as or slightly longer than broad, sculptured with a coarse, spaced rugulation which is very distinct. (Ethiopia, Ivory Coast, Ghana) . . . . ***edouardi*** (p. 225)

24 With the alitrunk in profile the dorsum without standing hairs of any description. Usually hairs are absent but rarely appressed or flattened stud-like hairs are present 25

– With the alitrunk in profile the dorsum with standing hairs which are longer than broad. Usually hairs are numerous and simple, acute or blunt apically but in some bizarre hairs are present or the number may be reduced to 1–3 pairs (beware abraded specimens) . . 43

25 Eyes very small, their maximum diameter distinctly less than the maximum width of the scape; eye diameter 0·10–0·13 × HW. Outline shape of dorsal alitrunk irregular (Figs 73, 74) and the anterior pronotum with a very strong transverse crest 26

– Eyes larger, their maximum diameter greater than the maximum width of the scape; eye diameter > 0·20 × HW. Outline shape of alitrunk more regular (Figs 25, 27, 28, 91, 110, 127, 141) and the anterior pronotum without a strong transverse crest 27

26 Dorsum of head between frontal carinae with 3–5 very coarse rugae. Outline of alitrunk as in Fig. 73. Squamate appressed hairs on first gastral tergite short and broad, the pubescence between the hairs sparse, short and inconspicuous (Fig. 71). SI 70–74. (Ivory Coast) . . ***diomandei*** (p. 286)

– Dorsum of head between frontal carinae with 9–12 fine rugae. Outline of alitrunk as in Fig. 74. Squamate appressed hairs on first gastral tergite elongate and narrow, the pubescence between the hairs sparse but long and distinct (Fig. 72). SI 75–81. (Mozambique) . . ***somniculosum*** (p. 290)

27 Propodeum unarmed, angulate or with a pair of minute tubercles (Figs 24, 91) 28
Propodeum bispinose or with a pair of elongate sharp triangular teeth 29

28 Anterior clypeal margin notched medially. Large black species with HW > 1·0, PW > 0·60. (South West Africa, South Africa) . . . . ***jordani*** (p. 248)
– Anterior clypeal margin entire medially. Smaller yellow species with HW < 1·0, PW < 0·60. (Rhodesia) . . . . ***arnoldi*** (p. 306)

29 Very long strong curved ammochaete hairs present on ventral surface of head which are at least as long as the maximum diameter of the eye (Fig. 19) 30
– Very long strong curved ammochaete hairs absent from ventral surfaces of head 38

30 Some or all of the dorsal surfaces of head and body with short, broad, blunted, very flattened and strongly appressed glittering silvery hairs 31
– Dorsal surfaces of head and body without such hairs, only sparse simple appressed pubescence present 33

31 Appressed silvery hairs long dense and strap-like, overlapping one another especially on vertex and alitrunk, very conspicuous. Sculpture of first gastral tergite mostly obscured by size and density of the hairs. CI 101–105. (Congo) . . . . ***galoasanum*** (p. 245)
– Appressed hairs sparse and spaced out on dorsal surfaces, not strap-like or overlapping. Sculpture of first gastral tergite clearly visible basally, not obscured by the hairs. CI 94–100 32

32 With the gaster in profile the base of the first tergite forming a thick, laterally projecting downcurved flange which overhangs the tergosternal suture basally and partially obscures the base of the sternite (Fig. 27). First gastral tergite sculptured basally but this is absent from the posterior half of the sclerite. Red-brown or red species. (Angola, Tanzania, Zambia, Malawi, Rhodesia, Botswana, South West Africa, South Africa) . . . . . ***setuliferum*** (p. 250)
– With the gaster in profile the base of the first tergite not projecting as above, the tergosternal suture and base of the sternite not concealed (Fig. 28). First gastral tergite usually finely sculptured from base to apex. Blackish brown to black species. (South Africa) . ***clunum*** (p. 244)

33 Postpetiole extremely broadened by lateral alar appendages so that in dorsal view it is almost as broad as the pronotum. Petiole node in dorsal view very much broader than long (Fig. 23). (South Africa) . . . . ***grandinode*** (p. 247)
– Postpetiole much narrower than pronotum in dorsal view, globular or subglobular, without lateral alar appendages or only with vestiges of such. Petiole node in dorsal view varying from as broad as long to slightly broader than long (Fig. 25) 34

34 Orange-brown to brick-red species 35
– Black or blackish brown species 36

35 Propodeal spines short and broad, triangular and acute, the basal width of each spine greater than its length (Fig. 29). (South West Africa, South Africa) . . . . ***glabratum*** (p. 246)
– Propodeal spines long, each spine distinctly much longer than its basal width (Fig. 30). (South West Africa) . . . . ***rufescens*** (p. 249)

36 Anterior clypeal margin with an extensive broad, deeply concave median emargination which occupies about half the width of the margin. (Angola, South West Africa, South Africa) . ***signatum*** (p. 251)
– Anterior clypeal margin with a shallow narrow median notch or indentation, scarcely visible in some specimens 37

37 Head in full-face view as broad or broader in front of eyes than behind (Fig. 21). Costulate sculpture of dorsal head fine, reaching to occipital margin. Eyes larger, 0·29–0·31 × HW; CI 84–89; HW < 1·00. (South West Africa) . . . . ***pogonion*** (p. 249)
– Head in full-face view narrowing anteriorly, narrower in front of eyes than behind (Fig. 20). Costulate sculpture of dorsal head very feeble, fading out behind level of eyes and replaced by fine superficial punctulation. Eyes smaller, 0·24–0·26 × HW; CI 94–97; HW > 1·20. (South West Africa) . . . . ***barbigerum*** (p. 243)

38 Anterior clypeal margin with a median notch or impression 39
– Anterior clypeal margin entire, without a notch or impression medially 40

39 First gastral tergite reticulate-punctate or shagreened at least on basal half. Dorsal alitrunk feebly reticulate-punctate. Mandibles generally retaining delicate longitudinal striation. (Rhodesia, South Africa) . . . . **jauresi** (part) (p. 348)

– First gastral tergite completely smooth. Dorsal alitrunk smooth with patchy vestiges of sculpture. Mandibles smooth with scattered small pits. (Ghana). . . . **qualarum** (p. 351)

40 Frontal carinae absent. Mandibles smooth, with scattered pits. Minute yellow species, the propodeum armed with a pair of short triangular teeth. (Ghana, Nigeria) . . **wadje** (p. 322)

– Frontal carinae distinct at least to level of posterior margins of eyes. Mandibles longitudinally striate. Larger red-brown species with propodeum bispinose 41

41 Scapes long, SI > 100 (Fig. 105). With the head in full-face view the scapes, when laid back, easily surpass the occipital corners by a distance at least equal to the maximum diameter of the eye. Dorsal alitrunk with coarse rugae. (Nigeria, Kenya, Tanzania, Rhodesia) . . **longicorne** (p. 328)

– Scapes shorter, SI < 100. With the head in full-face view the scapes, when laid back, either fail to reach or only just reach the occipital corners. Dorsal alitrunk without coarse rugae . 42

42 First gastral tergite with numerous scale-like appressed hairs which are also present, though less conspicuous, on the head and alitrunk. Dorsal alitrunk predominantly strongly reticulate-punctate (Nigeria). . . . . **bellicosum** (p. 296)

– First gastral tergite with fine appressed pubescence, without scale-like hairs anywhere on body. Dorsal alitrunk usually with fine weak rugulae with smooth interspaces; sometimes extensively unsculptured but never reticulate-punctate. (Rhodesia) . . **simulator** (p. 365)

43 Petiole squamiform (Figs 31–33, 37–39), strongly antero-posteriorly compressed, broad and scale-like in dorsal and posterior view. Postpetiole sometimes also antero-posteriorly compressed but rarely as strongly squamate as petiole 44

– Petiole variously shaped but never squamiform; generally nodiform. Rarely the petiole is compressed from front to back but in this case it is high and narrow in dorsal or posterior view, not scale-like (Figs 41, 42). 56

44 With the head in full-face view the eyes situated behind the midlength of the sides (Fig. 34). Frontal carinae strongly divergent posteriorly, running in a nearly straight line to the occipital corners. Clypeus more or less flat, regularly sculptured. CI 97–104 45

– With the head in full-face view the eyes situated at or slightly in front of the midlength of the sides (Figs 35, 36). Frontal carinae distinctly sinuate. Clypeus convex, often irregularly sculptured. CI usually 86–95, rarely approaching 97 46

45 Dorsal alitrunk coarsely reticulate-rugose. (Ghana) . . . . **sitefrum** (p. 259)

– Dorsal alitrunk finely and predominantly longitudinally rugose. (Rhodesia) . **repentinum** (p. 258)

46 Promesonotal dorsum unsculptured. First gastral tergite without hairs. (Rhodesia) . . **matopoense** (p. 257)

– Promesonotal dorsum sculptured. First gastral tergite with hairs 47

47 First gastral tergite with short but conspicuous basigastral costulae (Fig. 33). Dorsum of head reticulate-rugose from posterior clypeal margin to occipital margin (Fig. 36). (Rhodesia) . **umtaliense** (p. 261)

– First gastral tergite smooth, without basigastral costulae. Dorsum of head predominantly or entirely longitudinally rugulose; rugoreticulum when present is confined to the area close to the occipital margin (Fig. 35) 48

48 Hairs on first gastral tergite dense, long and very fine, acutely pointed apically. (Rhodesia, South Africa) . . . . **akermani** (p. 253)

– Hairs on first gastral tergite short and stout, generally sparse and most or all of them blunt or truncated apically 49

49 Dorsal transverse crest of petiole scale very thin and sharp, knife-edged (Fig. 31). (Tanzania). **squaminode** (p. 260)

– Dorsal transverse crest of petiole scale blunt or narrowly rounded, not at all knife-edged (Figs 32, 38, 39) 50

50 Postpetiole strongly antero-posteriorly compressed, almost as strongly squamate as petiole

(Fig. 32). In dorsal view the surface of the postpetiole narrow from front to back and very broad. (Rhodesia) . . . . ***do*** (p. 254)

– Postpetiole not or only slightly antero-posteriorly compressed, by no means as squamate as the petiole (Figs 38, 39). In dorsal view the surface of the postpetiole broadly rounded from front to back 51

51 Mandibles closely and coarsely longitudinally striate 52

– Mandibles smooth or at most with only vestigial sculpture 54

52 Postpetiole weakly sculptured dorsally, more strongly so on the sides. Postpetiole very broad, its maximum width 0·45 in dorsal view, about 0·76 × PW (Fig. 38). (South Africa) . . **platynode** (p. 258)

– Postpetiole unsculptured and much narrower, its maximum width about 0·36 in dorsal view, approximately 0·66–0·68 × PW (Fig. 39) 53

53 Dorsum of head between eyes and posterior extension of frontal carinae longitudinally rugulose. Larger species, TL 3·2 or more. (Sudan) . . . . ***nube*** (p. 257)

– Dorsum of head between eyes and posterior extension of frontal carinae finely reticulate. Smaller species, TL 2·5. (Kenya) . . . . ***dogieli*** (p. 254)

54 Eyes relatively small, maximum diameter 0·22–0·24 × HW. Dorsum of head with sharply defined dense longitudinal rugulae. (South Africa) . . . . . . ***frigidum*** (p. 256)

– Eyes relatively larger, maximum diameter 0·26–0·29 × HW. Dorsum of head with poorly defined scattered, irregular longitudinal rugulae 55

55 Frontal carinae closer together, their distance apart at level of midlength of eye 0·55–0·60 × HW. Node of postpetiole in profile low, broadly rounded and quite evenly convex. Uniform clear pale yellow species. (Rhodesia) . . . . . . ***jejunum*** (p. 256)

– Frontal carinae wider apart, their distance apart at level of midlength of eye 0·64–0·70 × HW. Node of postpetiole somewhat compressed from front to back, in profile relatively high and narrowly rounded. Gaster dark brown to black, contrasting with yellow head and alitrunk. (Rhodesia) . . . . ***flaviceps*** (p. 255)

56 Strongly bicoloured species with head and gaster yellow, the alitrunk black or blackish brown 57

– Uniformly coloured species or with gaster or head differing in shade from remainder of body, but never bicoloured black and yellow as above 58

57 Disc of postpetiole longitudinally costulate or rugose. (Cameroun, Gabon, Zaire) . . . ***coloreum*** (p. 297)

– Disc of postpetiole smooth and shining. (Zaire) . . . . . . ***postpetiolatum*** (p. 301)

58 Anterior clypeal margin notched or impressed medially and the mandibles smooth with scattered pits or at most with extremely feeble superficial markings between the pits, not at all longitudinally striate or rugulose 59

– Either the anterior clypeal margin entire or the mandibles distinctly longitudinally sculptured, or both 82

59 Antennal scapes long, SI > 100; the scapes when laid back on the head easily surpassing the occipital corners 60

– Antennal scapes shorter, SI < 100; the scapes when laid back on the head usually falling well short of the occipital corners, only rarely approaching them and never surpassing them . 61

60 Petiole in profile usually with anterior peduncle shorter than the thickness of the node at its mid-height. Rarely the two measurements approximately the same in which case the node is stout and substantial (Fig. 131), and SI < 120. (Liberia, Guinea, Ghana, Nigeria, Cameroun, Equatorial Guinea, Gabon, Zaire) . . . . ***africanum*** (part) (p. 355)

– Petiole in profile with anterior peduncle much longer than the thickness of the node at its mid-height (Fig. 130). SI > 120. (Very widely distributed throughout forests and woodland in Africa; locally may be very common). . . . . ***aculeatum*** (part) (p. 353)

61 Frontal carinae ending before level of eyes (Fig. 121). Propodeal dorsum transversely rugulose. Head long and narrow and scapes short, CI 78–79, SI 67–68. (Ghana, Cameroun) . . ***nodiferum*** (p. 349)

– Frontal carinae reaching back beyond level of posterior margins of eyes, usually approaching the occipital margin. Propodeal dorsum not transversely rugulose. CI and SI usually greater than the above, sometimes with one or the other as above or even lower, but never with both so low at the same time . . . 62

62 Petiole node in profile high and narrow, without a separated dorsal face as this is fused with the posterior face to give a continuous steep shallow convexity; highest point of node being the anterodorsal angle (Figs 41, 42) . . . 63
– Petiole nodiform in profile with a distinct dorsal face separated from the posterior face by a sharp or rounded angle (Figs 47–51, 112–116) . . . 64

63 Pronotal dorsum evenly longitudinally rugulose. Petiole node in profile with a sharp anterodorsal peak (Fig. 42). (South Africa) . . . ***vexator*** (p. 265)
– Pronotal dorsum mostly smooth, with only vestiges of sculpture. Petiole node in profile rounded, without an anterodorsal peak (Fig. 41). (South Africa) . . . ***titus*** (p. 264)

64 Base of first gastral tergite sculptured with costulae, rugulae, puncturation or a combination of these . . . 65
– Base of first gastral tergite unsculptured apart from small hair-pits . . . 73

65 Head and alitrunk light yellow to bright orange in colour . . . 66
– Head and alitrunk dull brown to black in colour . . . 69

66 Uniformly coloured species with head, alitrunk and gaster the same, or the gaster slightly lighter in shade than the head and alitrunk . . . 67
– Bicoloured species with head and alitrunk yellow to orange but the gaster much darker, very dark brown to black . . . 68

67 Basigastral costulae feeble, not sharply defined. Head relatively narrower, CI 78–81. Small species with HW 0·56–0·70 (usually < 0·65), PW 0·50 or less. (Zaire, Angola, Malawi, South Africa) . . . ***phasias*** (p. 273)
– Basigastral costulae distinct, sharply defined. Head relatively broader, CI 83–87. Larger species with HW 0·70–0·98 (usually > 0·80), PW 0·55 or more. (Zaire, Botswana, Malawi, Rhodesia, South Africa) . . . ***notiale*** (p. 271)

68 Dorsum of postpetiole strongly reticulate-rugose. (Sudan, Uganda, Guinea, Ivory Coast, Ghana, Togo, Zaire, Angola) . . . ***cristatum*** (p. 268)
– Dorsum of postpetiole smooth or at most with 1–3 faint longitudinal rugulae. (Ivory Coast, Ghana, Gabon, Zaire, Angola) . . . ***peutli*** (part) (p. 272)

69 Postpetiole smooth and shining or at most with faint superficial markings on disk, never reticulate-rugose or coarsely punctulate. (Sudan, Uganda, Fernando Po, Zaire, Angola) . . . ***pullulum*** (p. 273)
– Postpetiole reticulate-rugose, coarsely reticulate-punctate, or both . . . 70

70 Propodeum armed with a pair of minute triangular teeth, much shorter than the metapleural lobes (Fig. 51). (South Africa) . . . ***emeryi*** (p. 269)
– Propodeum armed with a pair of spines which are much longer than the metapleural lobes . . . 71

71 Dorsal alitrunk with a strongly raised unbroken sharp transverse crest at the junction of the pronotum and mesonotum. Large species, HW > 0·85. (Zaire, Tanzania, Rhodesia) . . . ***gazense*** (p. 270)
– Dorsal alitrunk either without such a crest or with a feeble, broken and meandering transverse ridge. If the latter then smaller species with HW < 0·70 . . . 72

72 Petiole in profile with the posterodorsal angle projecting and overhanging the posterior face (Fig. 50), the node in dorsal view longer than broad. Smaller species with relatively long scapes, HW < 0·70, SI > 80. (Ivory Coast, Ghana) . . . ***amentete*** (p. 266)
– Petiole in profile with the posterodorsal angle not projecting, not overhanging the posterior face (Fig. 47); the node in dorsal view broader than long. Larger species with relatively short scapes, HW > 0·80, SI < 80. (South Africa) . . . ***erectum*** (p. 269)

73 Dorsum of head between frontal carinae with a coarse wide-meshed rugoreticulum occipitally. Only 5 widely spaced longitudinal rugulae present between the frontal carinae at eye level.

(Ivory Coast, Ghana, Gabon, Zaire, Angola) . . . . ***peutli*** (part) (p. 272)

– Dorsum of head between frontal carinae finely longitudinally rugulose, without a coarse rugoreticulum occipitally. With more than 7 longitudinal rugulae present between the frontal carinae at eye level 74

74 Dorsal surface of postpetiole smooth or at most with faint punctulation, without rugulae or costulae. Petiole dorsum usually also smooth, rarely with faint traces of sculpture but never with a strong rugoreticulum 75

– Dorsal surface of postpetiole with distinct longitudinal rugulose or costulate sculpture. Petiole dorsum with a strong rugoreticulum 81

75 Head and alitrunk yellow or brownish yellow, the gaster usually black or at least distinctly much darker than the alitrunk 76

– Entirety of head and body uniform dark brown to blackish brown 78

76 Promesonotal dorsum irregularly rugulose, forming a broken and disorganized reticulum. Petiole in dorsal view with a narrow transverse crest bordering the anterior face of the node. (Zaire) . . . . ***gegaimi*** (p. 338)

– Promesonotal dorsum longitudinally rugulose. Petiole in dorsal view without a transverse crest bordering the anterior face of the node 77

77 Hairs on dorsal alitrunk elongate, fine and acute apically, the longest of them greater than the maximum diameter of the eye. Rugulae of head sharply defined, the spaces between them highly polished. Promesonotal rugulae sharply defined. (Ghana) . . . ***browni*** (p. 337)

– Hairs on dorsal alitrunk short and quite stout, blunt apically, the longest of them shorter than the maximum diameter of the eye. Rugulae of head feeble, the spaces between them densely punctulate or shagreened. Promesonotal rugulae feeble. (Kenya) . . ***miserabile*** (p. 342)

78 Rugulae of head sharply developed and strongly defined, the spaces between them very polished and without ground-sculpture. (Ghana, Cameroun) . . . . . . ***camerunense*** (p. 338)

– Rugulae of head blunted and only weakly defined, the spaces between them with a dense and conspicuous punctulate or granular ground-sculpture 79

79 Larger species, HW c. 0·78. Petiole node broader than long in dorsal view. Dorsal surfaces of both petiole and postpetiole with delicate punctulate sculpture. (Zaire) . ***ubangense*** (p. 343)

– Smaller species, HW 0·66 at maximum. Petiole node at least as broad as long, usually longer than broad. Dorsal surfaces of petiole and postpetiole either devoid of punctulate sculpture or with only the faintest vestiges present 80

80 Head longer and narrower, CI 85; scapes relatively long, SI 84. Node of petiole in dorsal view much longer than broad. Pronotal dorsum with weak scattered and disorganized rugulae. (Ivory Coast) . . . . ***hapale*** (p. 339)

– Head shorter and broader, CI 88–92; scapes relatively shorter, SI 78–80. Node of petiole in dorsal view as broad as long or slightly longer than broad. Pronotal dorsum finely and densely rugulose. (Cameroun) . . . . ***ictidum*** (p. 339)

81 Dorsum of head with fine regular longitudinal rugulae without trace of cross-meshes, the spaces between rugulae broad and highly polished. Postpetiole with a few widely spaced weak longitudinal rugulae. (Sierra Leone, Liberia, Guinea, Ivory Coast, Ghana, Nigeria, Zaire, Fernando Po) . . . . ***lucayanum*** (part) (p. 340)

– Dorsum of head with dense coarse irregular longitudinal rugulae with some cross-meshes present, the spaces between rugulae narrow and with strong ground-sculpture. Postpetiole coarsely longitudinally rugulose, the components dense and crowded together. (Ivory Coast, Ghana) . . . . ***versiculum*** (part) (p. 343)

82 Dorsal (outer) surface of hind tibiae either with projecting erect to subdecumbent strong hairs or with erect to suberect fine short pubescence, or with both 83

– Dorsal (outer) surface of hind tibiae without projecting hairs of any description and without elevated or standing pubescence, any pubescence which is present being decumbent to appressed and generally short 101

83 Eyes very small, maximum diameter distinctly less than the maximum width of the scape; maximum diameter of eye only 0·12–0·15 × HW. (Ivory Coast, Ghana, Nigeria). . . ***intonsum*** (part) (p. 288)

– Eyes larger, maximum diameter distinctly greater than the maximum width of the scape; maximum diameter of eye $>0{\cdot}20\times$ HW 84

84 With the head in full-face view the frontal carinae reaching back well beyond the level of the posterior margins of the eyes, usually approaching the occipital margin 85
– With the head in full-face view the frontal carinae short, never reaching the occiput, usually ending at or in front of the level of the posterior margins of the eyes 93

85 Mandibles sculptured, usually distinctly striate. Propodeum armed with a pair of spines which are much longer than the metapleural lobes 86
– Mandibles smooth with scattered minute pits. Propodeum armed with a pair of tubercles or small triangular teeth which are shorter than the metapleural lobes 90

86 Hairs projecting from dorsal (outer) surfaces of hind tibiae fine and extremely long, much longer than the maximum tibial width. All dorsal surfaces of head and body with abundant extremely long hairs (Fig. 144), the longest on the alitrunk $> 0{\cdot}50$. (Ivory Coast) . . ***magnificum*** (p. 363)
– Hairs or pubescence projecting from dorsal (outer) surfaces of hind tibiae distinctly much shorter than the maximum tibial width. Hairs on head and body much shorter, the longest on the alitrunk $< 0{\cdot}25$ 87

87 Anterior clypeal margin with a median notch or impression 88
– Anterior clypeal margin entire, without trace of a median notch or impression . . . 89

88 Pronotal dorsum and occipital region of head coarsely reticulate-rugose. Postpetiole in profile broadly and quite evenly rounded. Gaster deep brown to blackish, strongly contrasting to the remainder of the body which is yellow-brown or orange-brown. (Pantropical tramp species, introduced in South Africa) . . . . ***bicarinatum*** (p. 267)
– Pronotal dorsum longitudinally rugulose, occipital region of head predominantly longitudinally rugulose with a few weak cross-meshes. Postpetiole in profile peaked and narrowly rounded posterodorsally. Entirely uniform dark brown. (Tanzania) . . . . ***tychadion*** (p. 342)

89 With alitrunk in profile the metanotal groove deeply impressed (Fig. 113). Longest hairs on dorsal alitrunk longer than vertical diameter of eye. (Zaire) . . . . ***amissum*** (p. 336)
– With alitrunk in profile the metanotal groove vestigial or absent. Longest hairs on dorsal alitrunk much shorter than vertical diameter of eye. (South Africa) . . . ***longoi*** (p. 362)

90 All dorsal surfaces of head and body covered with a very dense fine pelt of soft acute hairs. Dorsal (outer) surfaces of hind tibiae with elongate hairs, the longest of which are at least equal to the maximum tibial width. Postpetiole shaped as in Fig. 128. 91
– All dorsal surfaces of head and body with sparse fine short hairs. Dorsal (outer) surfaces of hind tibiae with short erect or suberect pubescence which is less than half as long as the maximum tibial width. Postpetiole shaped as in Fig. 124 92

91 Propodeum with a pair of teeth. Colour clear pale yellow. Petiole node in profile more or less evenly convex, without differentiated anterior or posterior dorsal angles. (Ghana, Zaire) . ***meressei*** (p. 349)
– Propodeum merely angulate or with a pair of minute tubercles. Colour brown. Petiole node in profile not evenly convex, with differentiated angles. (Ghana) . . . ***psymanum*** (p. 351)

92 First gastral tergite finely and densely punctulate. (South Africa) . . . ***isipingense*** (p. 347)
– First gastral tergite unsculptured, smooth and highly polished. (Zaire) . . ***candidum*** (p. 345)

93 Anterior clypeal margin broadly and deeply concave medially (Fig. 22). Scapes short, SI < 80 94
– Anterior clypeal margin entire or with a small median notch or impression. If the latter then scapes long or very long, SI > 100 95

94 Antennal scapes with erect hairs similar to those on hind tibiae. (Botswana, South Africa) . ***peringueyi*** (p. 248)
– Antennal scapes only with pubescence, without erect hairs similar to those on hind tibiae. (South Africa) . . . . ***dichroum*** (p. 245)

95 With the head viewed from above and slightly behind the lateral portions of the clypeus rising to a distinct high angular peak in front of the antennal insertions, then sloping steeply towards the median portion of the clypeus (as in Figs 103, 104). Node of petiole in dorsal view as long as or longer than broad 96

– With the head viewed from above and slightly behind the lateral portions of the clypeus forming a low arc in front of the antennal insertions; not modified as above. Node of petiole in dorsal view broader than long 99

96 All dorsal surfaces of head and body, antennal scapes and all surfaces of legs with a very dense pelt of short soft hairs of approximately uniform length, the whole ant with a furry appearance. (Ghana) ***xuthum*** (p. 335)

– All dorsal surfaces of head and body with scattered stout hairs of varying length. Antennal scapes and surfaces of legs with spaced out short stout hairs 97

97 Head in side view with the lower occipital angle prolonged into a prominent lug or lobe, truncated apically (Fig. 107). Hairs on dorsal alitrunk short, the longest of them shorter than the maximum width of the hind tibia. (Zaire, Tanzania) ***bequaerti*** (p. 325)

– Head in side view with the lower occipital angle rounded and inconspicuous (Fig. 106). Hairs on dorsal alitrunk long, the longest of them exceeding the maximum width of the hind tibia 98

98 Dorsum of head behind level of eyes feebly sculptured to smooth, at most with a few very faint longitudinal rugulae, the surfaces shining and to a great extent smooth. (Rhodesia) ***bulawayense*** (p. 326)

– Dorsum of head behind level of eyes strongly longitudinally rugulose and rough, the surfaces extensively punctulate and quite dull. (Rhodesia) ***hortorum*** (p. 327)

99 Metapleural lobes elongate-triangular, prominent and conspicuous. Dorsal (outer) surfaces of hind tibiae with short elevated pubescence but without long fine hairs. Petiole node in profile low (Fig. 129). (Ghana) ***rimytyum*** (p. 356)

– Metapleural lobes minute or absent, always very inconspicuous. Dorsal (outer) surfaces of hind tibiae with elongate fine hairs. Petiole node in profile high and narrow (Figs 130, 131) 100

100 Petiole in profile usually with anterior peduncle shorter than the thickness of the node at its mid-height. Rarely the two measurements approximately the same in which case the node is stout and substantial (Fig. 131), and $SI < 120$. (Liberia, Guinea, Ghana, Nigeria, Cameroun, Equatorial Guinea, Gabon, Zaire) ***africanum*** (part) (p. 355)

– Petiole in profile with anterior peduncle much longer than the thickness of the node at its mid-height (Fig. 130). $SI > 120$. (Very widely distributed throughout forest and woodland in Africa; locally may be very common) ***aculeatum*** (part) (p. 353)

101 Eyes small to minute; either the maximum diameter of the eye distinctly less than the maximum width of the scape or the eye with 5 or fewer ommatidia in its longest row, or both. Maximum eye diameter $< 0{\cdot}16 \times HW$ 102

– Eyes larger; either the maximum diameter of the eye greater than the maximum width of the scape or the eye with more than 5 ommatidia in its longest row, or both. Maximum eye diameter $> 0{\cdot}16 \times HW$ 113

102 All surfaces of head, alitrunk, petiole, postpetiole and at least the base of the first gastral tergite blanketed with a very dense fine conspicuous reticulate-puncturation which dominates any other sculpture which may occur. (Rhodesia) ***semireticulatum*** (part) (p. 361)

– All surfaces of head, alitrunk, petiole, postpetiole not blanketed by dense reticulate-punctate sculpture. First gastral tergite unsculptured or at most with faint shagreening basally 103

103 Frontal carinae distinct, extending back well beyond the level of the eyes. Pronotal dorsum with rugose sculpture, either longitudinal or reticulate 104

– Frontal carinae short and feeble or absent. If the frontal carinae approach the level of the eyes then the pronotal dorsum lacks rugose sculpture 107

104 Pilosity of dorsal alitrunk and first gastral tergite fine and abundant, forming a dense pelt on these surfaces. With the head in full-face view the sides behind the eyes with numerous outstanding hairs, always obviously > 10, usually too numerous to count easily. Pubescence of scapes and hind tibiae not reclinate. Antennal scapes with SI 93–99. (Ivory Coast, Ghana, Nigeria) ***intonsum*** (part) (p. 288)

– Pilosity of dorsal alitrunk and first gastral tergite elongate and quite stout, the hairs spaced out and not forming a dense pelt on these surfaces. With the head in full-face view the sides behind the eyes with few outstanding hairs, 10 at most being present, usually less. Pubescence of scapes and hind tibiae reclinate, decumbent to appressed. Antennal scapes with SI 78–93 105

105 Pronotal dorsum quite regularly longitudinally rugulose, with few or no cross-meshes. (Rhodesia, Zambia, Malawi). ***shilohense*** (p. 290)
– Pronotal dorsum with a rugoreticulum or very irregularly rugulose 106

106 Sides of head above and behind the eyes predominantly reticulate-rugulose. Area of head between frontal carinae with 3–4 strong rugae present in front of the level of the eyes, these rugae stronger than the remaining cephalic sculpture. CI < 90, SI 86–93. (Ivory Coast, Ghana, Nigeria, Angola) ***jugatum*** (p. 289)
– Sides of head above and behind the eyes predominantly punctulate or granular, with only feeble sparse rugulae. Area of head between frontal carinae without 3–4 strong rugae which are stronger than the remaining cephalic sculpture. CI > 90, SI 81–83. (Gabon, Zaire) ***termitobium*** (p. 292)

107 Eyes with 3 or more ommatidia 108
– Eyes with only 1 or 2 facets or consisting only of a discoloured patch on side of head. 109

108 Anterior clypeal margin notched or impressed medially. Propodeum with a pair of triangular teeth. Eyes with 3–5 ommatidia. Larger species with HW 0·60–0·66. (Rhodesia) ***amaurum*** (p. 286)
– Anterior clypeal margin entire. Propodeum with a pair of minute denticles. Eyes with > 6 ommatidia. Smaller species with HW 0·48–0·52. (Kenya) ***pauper*** (p. 317)

109 Dorsal alitrunk sculptured, the promesonotum with distinct, predominantly longitudinal rugulation. (Nigeria) ***dysderke*** (p. 287)
– Dorsal alitrunk unsculptured, the promesonotum smooth and shining or at most with extremely faint vestiges of superficial punctulation in places 110

110 Minute species, HW $< 0{\cdot}50$, SL $< 0{\cdot}35$; scapes short, SI 68–71 111
– Larger species, HW $> 0{\cdot}50$, SL $> 0{\cdot}40$; scapes longer, SI 75–81 112

111 Eyes composed of a single distinct ommatidium. Lateral portions of clypeus strongly raised in front of antennal insertions, markedly convex above. (South Africa) ***warreni*** (p. 294)
– Eyes merely a discoloured patch on side of head. Lateral portions of clypeus low in front of antennal insertions, not convex above. (Ivory Coast) ***typhlops*** (p. 293)

112 Eyes with a single ommatidium. Mandibles feebly sculptured. Anterior clypeal margin with a strong median notch or impression. (Kenya, Rhodesia, Botswana) ***subcoecum*** (p. 291)
– Eyes with 2 ommatidia. Mandibles strongly longitudinally striate. Anterior clypeal margin at most with a feeble median indentation, difficult to see. (South Africa). ***traegaordhi*** (p. 292)

113 Species with exceptionally long appendages, SL $> 1{\cdot}20$, SI > 150 (Fig. 55) 114
– Species with shorter appendages, SL $< 1{\cdot}10$, SI < 125 115

114 Entire dorsum of head and alitrunk with all spaces between rugae packed with coarse reticulate-punctate sculpture. SI 154–162. (Zaire). ***dolichosum*** (p. 277)
– Dorsum of head and alitrunk with scattered rugulae, the spaces between which are smooth or at most with vestigial ground-sculpture. SI 174–180. (Angola) ***perlongum*** (p. 281)

115 Anterior clypeal margin with a broad deep almost semicircular excavation. Ammochaete hairs present on ventral surface of head. First gastral tergite without hairs. (South Africa) ***solidum*** (p. 252)
– Anterior clypeal margin entire or with a small median notch or impression. If the latter then ammochaete hairs absent or first gastral tergite with hairs, or both 116

116 Frontal carinae feeble, short or absent, fading out at or before the level of the posterior margins of the eyes, and SI 100 or more 117
– Either frontal carinae extending back well beyond the level of the posterior margins of the eyes and SI < 100, or both 125

117 Propodeum in profile merely angular or at most with a pair of minute denticles (Fig. 62) 118
– Propodeum in profile armed with a distinct pair of spines (Figs 108, 109, 111) 119

118 Pronotal dorsum with a ruguloreticulum or partial reticulum at least anteriorly, the entire pronotal surface with rugular sculpture. (Saudi Arabia, Yemen, Ethiopia) ***doriae*** (part) (p. 277)
– Pronotal dorsum mostly unsculptured, with a few feeble meandering rugulae which nowhere form a reticulum, most of pronotal surface without sculpture. (Ethiopia) ***gracile*** (part) (p. 279)

119 Propodeal dorsum in profile with one or more pairs of hairs arising from the surface between the metanotal impression and the base of the spines (Figs 109, 111) 120
– Propodeal dorsum in profile without hairs, the posteriormost pair occurring at or before the metanotal impression (Fig. 108) 123

120 With the head in full-face view the sides behind the eyes with numerous (usually > 10 on each side) short stout freely projecting hairs which break the outline of the sides (Fig. 101) . 121
– With the head in full-face view the sides behind the eyes either without projecting hairs or at most with 1–3 long fine hairs on each side (Fig. 102) 122

121 Pronotum smooth dorsally or at most with widely scattered vestigial rugulae. Median strip of petiole dorsum unsculptured. (South West Africa) . . . . **petersi** (p. 329)
– Pronotum very coarsely longitudinally rugose dorsally. Median strip of petiole dorsum strongly rugulose with densely punctulate spaces. (Nigeria) . . . . **asetyum** (p. 324)

122 Propodeal dorsum with only a single pair of hairs, situated on the dorsum above the spiracle. Hairs on first gastral tergite generally blunt apically. (Ivory Coast, Nigeria, Zaire, Botswana) . . . . **khyarum** (p. 327)
– Propodeal dorsum with several pairs of hairs. Hairs on first gastral tergite slender, generally acute apically. (Rhodesia) . . . . **sepositum** (p. 331)

123 Dorsal alitrunk covered with very coarse, sharply raised rugose sculpture, the spaces between the rugae shining, without dense reticulate-punctate sculpture. (Rhodesia) . **gladstonei** (p. 326)
– Dorsal alitrunk without coarse rugose sculpture but often with fine rugulae. If the latter then the spaces between the rugulae are densely reticulate-punctate, generally matt and dull . 124

124 Sculpture of dorsal alitrunk and head strong, consisting of fine, usually longitudinal rugulae and a dense reticulate-puncturation which covers the entire surface. First gastral tergite usually completely covered with fine sculpture, more rarely only partially so, matt and dull. (Very widespread in savannah to desert conditions throughout Africa, also occurring in African Mediterranean, Saudi Arabia and the Malagasy region) . . **sericeiventre*** (p. 332)
– Sculpture of dorsal alitrunk and head feeble or absent, at most with a few very weak meandering rugulae, more usually with just a feeble superficial punctulation. First gastral tergite either unsculptured or with superficial reticulation, generally shining. (Angola, Botswana, Mozambique, South West Africa, South Africa; also in Malagasy region) . **quadrispinosum** (p. 330)

125 Propodeum in profile armed with a pair of acute spines which are distinctly longer than their basal width and which are much longer than the metapleural lobes except rarely when the lobes themselves are elongate and strongly extended (Figs 40, 43, 57–60, 78, 79, 82–84, 112, 137–140, 142, 143 126
– Propodeum in profile usually with a pair of short triangular teeth which at most are only about as long as their basal width and which at most are equal in length to the metapleural lobes except when the lobes are reduced to low rounded flanges; more rarely propodeum merely angulate or unarmed (Figs 52, 62, 92–96, 125) 154

126 Anterior clypeal margin with a median notch or impression, small in a few species but generally easily visible 127
– Anterior clypeal margin entire, without trace of a median notch or impression [in one species the median clypeal carina may bifurcate anteriorly, but no notch is present] . . . 136

127 Postpetiole unsculptured, smooth and shining 128
– Postpetiole with rugulose, punctulate or shagreened sculpture 131

128 Long hairs on dorsum of alitrunk, pedicel segments and first gastral tergite plumose apically. (Swaziland) . . . . **plumosum** (p. 263)
– Long hairs on dorsum of alitrunk, pedicel segments and first gastral tergite simple, either acute or blunt apically but never plumose 129

129 Translucent appendage of sting dentiform. Frontal carinae weakly developed and only feebly sinuate, scarcely stronger than the rest of the cephalic sculpture. Petiole in profile with the dorsal length of the node about equal to the height of the tergal portion. (Congo) . . **luteipes** (p. 341)

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* Host species of *T. microgyna*.

– Translucent appendage of sting spatulate. Frontal carinae strong and markedly sinuate, much stronger than the rest of the cephalic sculpture. Petiole in profile high and narrow, the dorsal length of the node much less than the height of the tergal portion (Fig. 40) . . . 130

130 Hairs on dorsal alitrunk and first gastral tergite coarse, stout and blunt apically. Dorsum of head with numerous sharply defined narrow regular parallel rugulae (Fig. 45). (South Africa) . . . . ***regulare*** (part) (p. 263)

– Hairs on dorsal alitrunk and first gastral tergite fine and acute apically. Dorsum of head with low rugulae which are not sharply defined and which are irregular, spaced out and meandering (Fig. 44). (South Africa, Swaziland) . . . . ***grassii*** (p. 262)

131 Dorsal alitrunk with very short stout strongly blunted hairs, contrasting strongly to the hairs on the first gastral tergite which are elongate, fine and acute, and 3–4 times longer than the alitrunk hairs (Fig. 139). (South Africa) . . . . ***dominum*** (p. 360)

– Dorsal alitrunk with hairs subequal in length with those on the first gastral tergite, the hairs in both places similarly shaped 132

132 Petiole or postpetiole dorsum, or both, with strong rugulation or a rugoreticulum. Dorsum of petiole node as long as or longer than broad 133

– Petiole and postpetiole dorsum predominantly reticulate-punctate, without rugulae or at most with only a few very feeble rugulae. If the latter then dorsum of petiole node is much broader than long 135

133 Postpetiole dorsum completely covered with parallel unbroken closely packed longitudinal rugulae or costulae, without broad vacant spaces between nor with any cross-meshes. (Ivory Coast, Ghana) . . . . ***versiculum*** (part) (p. 343)

– Postpetiole dorsum differently sculptured. Either longitudinal rugulae present are feeble, spaced out, irregular and broken or reticular cross-meshes are present 134

134 Larger species, HW 0·76–0·82. Petiole node in profile with the dorsal length less than the height of the tergal portion; the anterior and posterior faces of the node slightly convergent dorsally (Fig. 137). (Mozambique) . . . . ***amatongae*** (p. 358)

– Smaller species, HW 0·64–0·72. Petiole node in profile with the dorsal length equal to or greater than the height of the tergal portion; the anterior and posterior faces of the node vertical and parallel (Fig. 112). (Sierra Leone, Liberia, Guinea, Ivory Coast, Ghana, Nigeria, Zaire, Fernando Po) . . . . ***lucayanum*** (part) (p. 340)

135 Hairs on dorsal alitrunk much longer than maximum diameter of eye (Fig. 138). Dorsal alitrunk predominantly or entirely punctulate or reticulate-punctate, with little or no longitudinal rugulation. Head both absolutely and relatively broader, HW 0·82–0·96, CI 88–92 (Fig. 135). (South Africa) . . . . ***capense*** (p. 359)

– Hairs on dorsal alitrunk much shorter than maximum diameter of eye (Fig. 140). Dorsal alitrunk with conspicuous strong longitudinal rugulae which dominate the sculpture. Head both absolutely and relatively narrower, HW 0·72–0·76, CI 83–84 (Fig. 134). (South Africa) ***lobulicorne*** (p. 361)

136 Petiole node in profile with the anterior and dorsal faces united to form a single continuous evenly curved convexity, the faces not separated by an angle (Figs 142, 143) . . . 137

– Petiole node in profile with the anterior and dorsal faces separated by an angle which may be sharp or obtuse, the two faces never forming a continuous even curve 138

137 Mandibles with 3 teeth followed by a series of 4 denticles. Dorsum of head between frontal carinae coarsely and irregularly rugose from clypeus to occiput, with abundant anastomoses and cross-meshes everywhere. (Sudan). . . . . ***viticolum*** (p. 366)

– Mandibles with 3 teeth followed by a series of 6–7 denticles. Dorsum of head between frontal carinae with fairly regular longitudinal rugulae, without anastomoses or cross-meshes except close to occiput, sometimes also absent here. (Ghana, Nigeria, Cameroun, Zaire) . ***quadridentatum*** (p. 364)

138 Mandibles smooth and shining, unsculptured except for small pits. (Rhodesia) . ***agile*** (p. 275)

– Mandibles distinctly longitudinally striate or rugulose 139

139 Postpetiole completely smooth, everywhere unsculptured. Petiole almost entirely smooth, at most with faint traces of sculpture on upper parts of sides 140

– Postpetiole sculptured either dorsally, laterally or everywhere. If sculpture of postpetiole is weak then petiole is strongly sculptured everywhere 142

140 Scapes long, SI 105 or more. Dorsum of head at level of eyes with 5–7 longitudinal rugulae between the frontal carinae. Petiole node in dorsal view longer than broad . . . 141

– Scapes shorter, SI < 85. Dorsum of head at level of eyes with 10–12 longitudinal rugulae between the frontal carinae. Petiole node in dorsal view broader than long. (South Africa) ***regulare*** (part) (p. 263)

141 Longitudinal rugulae on dorsal head without cross-meshes and without anastomoses or reticulation occipitally; ground-sculpture between the rugulae almost effaced, the surfaces virtually smooth. SI 105. (Angola) . . . . ***youngi*** (p. 284)

– Longitudinal rugulae on dorsal head with scattered cross-meshes, the occipital region with distinct anastomoses or a reticulum; ground-sculpture between the rugulae weak but fairly conspicuous. SI 111–113. (Kenya) . . . . ***metactum*** (p. 280)

142 Petiole in profile with the anterior face high, the dorsal and posterior faces fused and forming a single continuous steep convexity, without a posterodorsal angle (Fig. 84). (Ivory Coast, Ghana) . . . . ***invictum*** (p. 300)

– Petiole in profile with the dorsal and posterior faces separate and distinct, the two separated by a sharp or rounded posterodorsal angle 143

143 Eyes relatively large, the maximum diameter at least 0·27 × HW and usually more. In general the longest row of facets in the eye usually with 9 to > 10, only rarely with 8 ommatidia. SI always > 100 144

– Eyes relatively small, the maximum diameter at most 0·25 × HW and usually less. In general the longest row of facets in the eye usually with 6–7 ommatidia, only rarely with 8. SI usually < 100 but sometimes slightly more 147

144 Promesonotal dorsum smooth and very shining, without trace of punctulate sculpture and usually also without rugulae although sometimes a couple of feeble and very widely spaced rugulae may be present. (Sudan, Uganda, Rhodesia, South Africa) . . ***laevithorax*** (p. 279)

– Promesonotal dorsum distinctly sculptured with rugulae and conspicuous punctulation . 145

145 Maximum diameter of eye 0·28–0·31 × HW. If at lower end of this range then other measurements as follows: HW 0·68–0·72, CI 77–83, SL 0·70–0·80. (Sudan, Tanzania, Zaire, Rhodesia, South Africa) . . . . ***setigerum*** (p. 283)

– Maximum diameter of eye 0·25–0·28 × HW. If at upper end of this range then other measurements as follows: HW 0·58–0·67, CI 81–86, SL 0·62–0·70 146

146 Petiole node in profile with both anterodorsal and posterodorsal angles bluntly rounded (Fig. 58), the anterior and posterior faces of the node distinctly convergent dorsally. Base of first gastral tergite smooth. (South Africa) . . . . ***avium**** (part) (p. 276)

– Petiole node in profile with the anterodorsal angle a sharp right-angle (Fig. 60) which often projects into a low peak or crest. Posterodorsal angle more obtuse but well developed, the anterior and posterior faces only slightly convergent dorsally. Base of first gastral tergite with a band of fine punctulation or shagreening, weak in some individuals. (Rhodesia, South Africa) . . . . ***frenchi*** (p. 278)

147 Base of first gastral tergite sculptured with costulae, puncturation, or both 148

– Base of first gastral tergite unsculptured, smooth and shining except for hair-pits . . 149

148 Alitrunk and pedicel segments dorsally blanketed by a fine, very dense reticulate-puncturation, rugulose sculpture which is present is very feeble and secondary to the very conspicuous puncturation. All dorsal surfaces of body with dense very short and fine pilosity. (Nigeria) ***granulatum*** (p. 299)

– Alitrunk and pedicel segments dorsally with a distinct wide rugoreticulum, the spaces between which are mostly smooth and without puncturation. Dorsal alitrunk and gaster with scattered long stout blunt hairs. (Ivory Coast) . . . . ***pylacum*** (p. 301)

149 All hairs on dorsal surfaces of head, alitrunk, pedicel segments and gaster bizarre, fan-shaped, with 7–10 branches on each hair radiating from the apex of a short basal portion like the ribs of a fan. (Ivory Coast, Ghana) . . . . ***flabellum*** (p. 298)

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* Host species of *T. parasiticum*.

– All hairs on dorsal surfaces of head, alitrunk, pedicel segments and gaster simple, usually stout and generally blunt apically 150

150 Dorsum of postpetiole with an unsculptured or virtually unsculptured median longitudinal strip; the dorsum distinctly less strongly sculptured than the sides and very obviously less strongly sculptured than the petiole dorsum. (Ivory Coast) . . . . ***sigillum*** (p. 303)
– Dorsum of postpetiole sculptured, as strongly sculptured as the sides and usually about as strongly sculptured as the petiole dorsum 151

151 Species with broader head and shorter scapes, CI 89–95, SI 80–85. (Angola) . . . ***saginatum*** (p. 302)
– Species with narrower head and longer scapes, CI 84–89, SI 95–103 152

152 Lightly coloured species, uniform yellowish brown to light orange-brown. (Sudan, Kenya, Uganda, Zaire, Angola) . . . . ***kestrum*** (p. 300)
– Much darker species, uniform blackish brown to black 153

153 Hairs on dorsum of head (discounting those on clypeus and occiput) and on first gastral tergite markedly longer than the maximum diameter of the eye. (Gabon) . . ***geminatum*** (p. 298)
– Hairs on dorsum of head (discounting those on clypeus and occiput) and on first gastral tergite not obviously longer than the maximum diameter of the eye. (Guinea, Ivory Coast, Ghana, Nigeria) . . . . ***ataxium*** (p. 295)

154 Scapes relatively long, SI > 100, usually distinctly so 155
– Scapes relatively short, SI < 100, usually much less 158

155 With the head in full-face view the sides behind the eyes without projecting hairs. Base of first gastral tergite faintly reticulate or punctulate. (South West Africa) . . ***praetextum*** (p. 282)
– With the head in full-face view the sides behind the eyes with projecting hairs. Base of first gastral tergite smooth 156

156 Propodeum in profile with a pair of short triangular teeth. Petiole in dorsal view distinctly broader than long, in profile with the dorsal length less the tergal height (Fig. 58). Frontal carinae running to occipital margin. Maximum diameter of eye 0·25–0·28 × HW. (South Africa) . . . . ***avium*** (part) (p. 276)
– Propodeum in profile angular or with minute denticles, without teeth. Petiole in dorsal view slightly longer than broad, in profile with the dorsal length greater than the tergal height (Fig. 62). Frontal carinae fading out behind eye level. Maximum diameter of eye 0·29–0·33 × HW 157

157 Pronotal dorsum with a rugoreticulum or partial reticulum present at least anteriorly, the entire pronotal surface with rugulose sculpture. (Saudi Arabia, Yemen, Ethiopia) . . ***doriae*** (part) (p. 277)
– Pronotal dorsum mostly unsculptured, with a few feeble meandering rugulae which nowhere form a reticulum, most of pronotum devoid of sculpture. (Ethiopia) . ***gracile*** (part) (p. 279)

158 Propodeum in profile absolutely unarmed, the dorsum passing into the declivity through a regular and continuous smooth convexity, without any trace of teeth, tubercles or an angle. (Ghana) . . . . ***convexum*** (p. 322)
– Propodeum in profile usually with a pair of teeth, more rarely angulate or with a pair of tubercles, but the dorsum and declivity always separated by one of these 159

159 Anterior clypeal margin with a median notch or impression. 160
– Anterior clypeal margin entire, without a median notch or impression 161

160 Small species with long scapes, HW 0·52–0·63, SI 85–91. Dorsal alitrunk with abundant fine short hairs. Entire dorsum of head and body blanketed by a dense and very conspicuous reticulate-puncturation. (Rhodesia) . . . . . . ***semireticulatum*** (part) (p. 361)
– Larger species with short scapes, HW 0·72–0·88, SI 72–79. Dorsal alitrunk at most with only 1–2 pairs of short hairs. Without blanketing reticulate-punctate sculpture on head and body. (Rhodesia, South Africa) . . . . ***jauresi*** (part) (p. 348)

161 Leading edges of scapes with erect short hairs or long strong subdecumbent hairs. First gastral tergite covered from base to apex by a strong dense consistently coarse reticulate-puncturation 162

– Leading edges of scapes only with fine short pubescence which is usually decumbent or appressed. First gastral tergite unsculptured or with a basal band of punctulation or shagreening, only rarely the sculpture more extensive 163

162 Hairs on dorsal alitrunk and gaster very short, the longest of them scarcely longer than the propodeal teeth. Mandibles smooth with scattered pits. Rugulae on dorsum of head fine and regularly longitudinal. (Ghana) . . . . **elidisum** (p. 346)

– Hairs on dorsal alitrunk and gaster much longer, the longest of them 3–4 times longer than the propodeal teeth. Mandibles longitudinally striate. Rugulae on dorsum of head strong and irregular, meandering and with numerous cross-meshes. (Zaire) . . . . **unicum** (p. 366)

163 Hairs on dorsal alitrunk fine and acute, may be short in which case the head in full-face view is rectangular, the sides straight and parallel 164

– Hairs on dorsal alitrunk stout and blunt, usually short and scattered. Head in full-face view not rectangular, the sides convex or the head width increasing posteriorly 166

164 Frontal carinae ending at or in front of the level of the eyes [species of *caespitum*-group]. (Annobon I., probably introduced) . . . . **nautarum** (p. 321)

– Frontal carinae extending back almost to occipital margin 165

165 Pronotal dorsum with a coarse straight longitudinal costa medially which dominates the remaining rugulose sculpture. Colour brownish yellow. (Ghana) . . . . **pialtum** (p. 350)

– Pronotal dorsum without a coarse median costa, the surface weakly longitudinally rugulose. Colour pale yellow. (Ghana, Nigeria, Zaire) . . . . **dumezi** (p. 346)

166 Eyes relatively large, maximum diameter 0·29 × HW at least, usually greater, and longest row of facets in the eye containing 10 or more ommatidia. Ventral surface of head behind buccal cavity commonly with 2–4 elongate hooked or J-shaped hairs 167

– Eyes relatively smaller, maximum diameter 0·27 × HW at most, usually less, and longest row of facets in the eye containing 7–8 ommatidia at maximum. Ventral surface of head behind buccal cavity without elongate hooked or J-shaped hairs 172

167 Uniform pale yellow species 168

– Uniform very dark brown or black species 169

168 Propodeum armed with a pair of broad blunt triangular teeth (Fig. 93). Ground-sculpture of head between the rugulae feeble, the surfaces glossy. Petiole node in dorsal view transverse, much broader than long. (Rhodesia) . . . . **luteolum** (p. 313)

– Propodeum bluntly angular, without projecting teeth (Fig. 92). Ground-sculpture of head between the rugulae a very distinct fine reticulate-punctulation, the surfaces matt and dull. Petiole node in dorsal view about as broad as long. (Rhodesia) . . . . **berbiculum** (p. 307)

169 Base of first gastral tergite with a band of shagreening or of reticulate-punctate sculpture . 170

– Base of first gastral tergite unsculptured except for hair pits. 171

170 Eyes very large and set well forward on the head (Fig. 87), their maximum diameter 0·37–0·39 × HW. In profile the maximum diameter of the eye more than 3 times greater than the distance separating the anterior margin of the eye from the mandibular insertion at their closest approach (Fig. 88). (Rhodesia, Botswana, South Africa) . . . . **oculatum** (p. 316)

– Eyes much smaller and set at about the midlength of the head (Fig. 89), their maximum diameter 0·29–0·32 × HW. In profile the maximum diameter of the eye about equal to the distance separating the anterior margin of the eye from the mandibular insertion at their closest approach (Fig. 90). (Rhodesia) . . . . **argenteopilosum** (p. 306)

171 Antennal scapes longer, SI 80–87. Metapleural lobes triangular and acute (Fig. 95). (Lesotho) **bevisi** (p. 308)

– Antennal scapes shorter, SI 71. Metapleural lobes bluntly rounded (Fig. 94). (South West Africa) . . . . **krynitum** (p. 313)

172 Frontal carinae long and strongly developed throughout their length, running unbroken almost to the occipital margin and forming the dorsal borders of the broad and distinctive antennal scrobes; the carinae always more strongly developed than the remaining cephalic sculpture 173

– Frontal carinae feeble or reduced, either fading out posteriorly or uniformly weak, sometimes broken or interrupted and usually not more strongly developed than the remaining cephalic sculpture; antennal scrobes vestigial to absent 179

173 Dorsum of head with spaces between longitudinal rugulae smooth or only superficially sculptured, without a dense blanketing reticulate-punctulation or a coarse granular mat . 174

– Dorsum of head with spaces between longitudinal rugulae blanketed by a dense reticulate-punctulation or by a coarse granular mat 176

174 Scapes relatively long, SI 90–93. Dorsum of head with only 5 weak longitudinal rugulae between the frontal carinae at the level of the eyes. (Central African Empire, Zaire). . ***buthrum*** (p. 309)

– Scapes relatively short, SI 74–83. Dorsum of head with 8–10 longitudinal rugulae between the frontal carinae at the level of the eyes 175

175 Mandibles finely shagreened, not striate. (Guinea) . . . . ***anxium*** (p. 305)

– Mandibles striate. (Angola, Rhodesia, South West Africa, South Africa) . . . . ***mossamedense*** (part) (p. 314)

176 Sides of head immediately behind eyes with a single stout projecting hair, directed anteriorly at an angle of about 45° (Fig. 98). (Very widespread throughout forested or wooded areas; also occurring in Malagasy region) . . . . ***delagoense*** (p. 311)

– Sides of head immediately behind eyes without such a hair, either hairless or with a number of minute decumbent to appressed hairs (Figs 97, 99) 177

177 With the head in full-face view the sides behind the eyes with a number of very short fine curved decumbent to appressed hairs which are directed anteriorly (Fig. 99). Hairs on first gastral tergite dense, at least as long as the maximum width of the hind tibia. (Ivory Coast, Ghana, Gabon, Zaire). . . . . ***rhetidum*** (p. 318)

– With the head in full-face view the sides behind the eyes without hairs (Fig. 97). Hairs on first gastral tergite sparse, shorter than the maximum width of the hind tibia 178

178 Yellow to yellowish brown species, sometimes with gaster darker than head and alitrunk. Mandibles lightly shagreened or feebly striate. (Cosmopolitan tramp species, very widespread in Africa) . . . . ***simillimum*** (p. 319)

– Uniform blackish brown species. Mandibles smooth with scattered pits. (South Africa, Lesotho) . . . . ***bothae*** (p. 309)

179 Basal one-third or more of first gastral tergite strongly sculptured, punctulate or densely shagreened 180

– First gastral tergite unsculptured or at most with a narrow band of faint punctulation at the extreme base 181

180 With the head in full-face view the sides between the eye and the long hair at the occipital corner with 2 freely projecting stout hairs. Scapes longer, SI 86–90. Eyes with 7 ommatidia in the longest row. (Ethiopia) . . . . ***ghindanum*** (p. 312)

– With the head in full-face view the sides between the eye and the long hair at the occipital corner without projecting hairs. Scapes shorter, SI 74. Eyes with 9 ommatidia in the longest row. (Ethiopia) . . . . ***nefassitense*** (p. 315)

181 Median longitudinal strip on dorsum of head unsculptured and shining, without rugulose or punctulate sculpture. (South Africa) . . . . ***poweri*** (p. 317)

– Median longitudinal strip on dorsum of head with longitudinal rugulae and usually also with punctulate ground-sculpture 182

182 Yellow to yellowish brown species 183

– Rich dark brown to blackish brown species 184

183 Longitudinal rugulae on dorsum of head weak, very fine and narrow, not strongly developed; the rugulae superimposed upon a finely reticulate-punctulate or granular ground-sculpture. SI range 79–87. (Cosmopolitan tramp species, widespread in Africa) . . ***caldarium*** (p. 310)

– Longitudinal rugulae on dorsum of head strongly developed, sharp, broad and very conspicuous; the spaces between the rugulae unsculptured or at most with only the faintest superficial ground-sculpture. SI range 74–80. (Angola, Rhodesia, South West Africa, South Africa) . . . . ***mossamedense*** (part) (p. 314)

184 Mandibles smooth and shining with scattered minute pits. (South Africa) . ***pusillum*** (p. 318)
– Mandibles longitudinally striate 185

185 Larger species, HW 0·52–0·56, SI 84–91. Propodeum armed with a pair of short triangular teeth. (Sudan, Kenya, Rhodesia, South Africa) . . . . ***altivagans*** (p. 305)
– Smaller species, HW 0·44; SI 77. Propodeum without teeth, the dorsum and declivity separated only by a prominent angle. (Sudan, Kenya) . . . . ***nigrum*** (p. 316)

The species-groups

Nineteen species-groups are presently recognized as occurring in sub-Saharan Africa. Because of the large number of species involved I have attempted to draw up a rough key to the groups of the Ethiopian region as they are presently defined. The main purpose of this key is to facilitate the placement of further new species, as they are discovered, which cannot be run out easily in the key to species or which give an ambiguous result when run through that key. I should stress that this key to species-groups is provisional and is intended as an adjunct to the species-level key, not as an alternative to it.

The provisional nature of the species-group key is shown by the fact that many of the groups run out in more than one couplet. One reason for this is of course that one or two species in any given group may be specialized in one particular character in a line away from the norm for their group, but converging in that character upon what is usual in another group. Now if this particular character is chosen for a group-key couplet (by dint of its being fairly obvious and unlikely to be confused) then the group becomes artificially split, merely through an attempt to provide a fairly workable key without too many either/or, or otherwise ambiguous, couplets.

A second reason is that some species-groups are formed in this paper merely for convenience (*quadridentatum*-group for instance), and contain a fortuitous assemblage of species with some characters in common but which are not obviously closely related, and which do not fit any better-defined group. Such forms have been amalgamated to prevent the proliferation of groups with only 1 or 2 species each, but obviously some such groups will split widely when a species-group key is constructed.

Provisional key to species-groups (workers)

1 Antennae with 11 segments 2
– Antennae with 12 segments 4

2 Petiole squamiform or represented in profile by a high, narrow node (Figs 5–12) . . . . ***weitzeckeri*-group** (p. 224)
– Petiole strongly nodiform (Figs 13, 16) 3

3 Dorsal (outer) surface of hind tibiae only with fine pubescence. Hairs on first gastral tergite directed towards midline, at least in part . . . . ***angulinode*-group** (p. 237)
– Dorsal (outer) surface of hind tibiae with long projecting hairs. Hairs on first gastral tergite not directed towards the midline . . . . ***tortuosum*-group** (p. 235)

4 SI 100 or more 5
– SI < 100 9

5 Frontal carinae extending back well beyond the level of the posterior margins of the eyes (Figs 54, 56, 86). 6
– Frontal carinae ending at or in front of the level of the eyes (Figs 53, 101, 132) 7

6 Maximum diameter of eye 0·25 × HW at minimum, usually greater. Longest row of facets with at least 9 ommatidia. Petiole node high and quite narrow in profile (Figs 58–60) . . . ***setigerum*-group** (part) (p. 274)
– Maximum diameter of eye 0·24 × HW at maximum, usually smaller. Longest row of facets with 7–8 ommatidia. Petiole node long and low in profile (Figs 78–79) . . . . . ***flabellum*-group** (part) (p. 294)

7 Petiole node in profile long and low, in dorsal view usually longer than broad (Figs 52, 62, 108, 109) . . . 8
– Petiole node in profile high and narrow, in dorsal view distinctly broader than long (Figs 130–131) . . . ***aculeatum***-group (p. 352)

8 Lateral portions of clypeus prominent as a tooth or crest on each side in full-face view. When viewed from above and behind the lateral parts of the clypeus rise to a high peak in front of the antennal insertions and then slope steeply down towards the median portion of the clypeus (Figs 103, 104) . . . ***sericeiventre***-group (p. 323)
– Lateral portions of clypeus not strongly modified as above . . . ***setigerum***-group (part) (p. 274)

9 Eyes very small or minute, maximum diameter $<0{\cdot}17 \times$ HW, less than maximum width of scape; commonly with only 1–5 facets altogether but always with 5 or less ommatidia in the longest row (Figs 67–70) . . . ***shilohense***-group (p. 284)
– Eyes larger, maximum diameter $>0{\cdot}20 \times$ HW, greater than maximum width of scape; with >5 ommatidia in the longest row . . . 10

10 Petiole, and sometimes also postpetiole, squamiform (Figs 31–33, 37–39) ***squaminode***-group (p. 252)
– Petiole not squamiform . . . 11

11 Lamellate appendage of sting spatulate or linear . . . ***grassii***-group (p. 261)
– Lamellate appendage of sting dentiform, triangular or pennant-shaped . . . 12

12 Frontal carinae short, ending in front of the level of the posterior margins of the eyes . . . 13
– Frontal carinae long, reaching back well beyond the level of the posterior margins of the eyes, usually approaching or even reaching the occipital margin . . . 16

13 Either anterior clypeal margin with a broad deep indentation medially or ventral surface of head with ammochaete hairs present, or both (Figs 19–22) . . . ***solidum***-group (p. 242)
– Anterior clypeal margin entire and ventral surface of head without ammochaete hairs . . . 14

14 Hairs on dorsal alitrunk and/or first gastral tergite short, stout, and blunt apically . . . ***simillimum***-group (part) (p. 303)
– Hairs on dorsal alitrunk and first gastral tergite fine and acute apically, or hairs absent from both these surfaces . . . 15

15 Mandibles striate . . . ***caespitum***-group (p. 321)
– Mandibles smooth . . . ***convexum***-group (p. 321)

16 Anterior clypeal margin with a median notch or impression, even if small . . . 17
– Anterior clypeal margin entire, without trace of a median notch or impression . . . 21

17 Occipital region of head with a rugoreticulum . . . ***bicarinatum***-group (p. 265)
– Occipital region of head at most with a few anastomoses, without a rugoreticulum . . . 18

18 Propodeum with a pair of small triangular teeth or denticles (Figs 126, 127) . . . ***dumezi***-group (part) (p. 344)
– Propodeum with a pair of spines (Figs 112, 114–116, 137–140) . . . 19

19 Dorsal surfaces of petiole and postpetiole unsculptured or at most with only vestigial traces of sculpture . . . ***camerunense***-group (part) (p. 335)
– Dorsal surfaces of petiole, postpetiole, or both distinctly sculptured . . . 20

20 Node of petiole in dorsal view longer than broad . . . ***camerunense***-group (part) (p. 335)
– Node of petiole in dorsal view broader than long . . . ***capense***-group (p. 358)

21 Propodeum armed with a pair of elongate spines . . . 22
– Propodeum at most with a pair of short triangular teeth; sometimes only with a pair of denticles, more rarely unarmed . . . 25

22 Dorsal (outer) surface of hind tibiae with erect or suberect hairs or pubescence . . . 23
– Dorsal (outer) surface of hind tibiae without erect or suberect hairs or pubescence . . . 24

23 Occipital region of head with a rugoreticulum . . . ***quadridentatum***-group (part) (p. 362)
– Occipital region of head without a rugoreticulum . . . ***camerunense***-group (part) (p. 335)

24 Either the anterior and dorsal faces of the petiole node in profile meeting in a smooth curve without a developed anterodorsal angle (Figs 142, 143), or the eyes large, with maximum diameter >0·30 × HW . . . . ***quadridentatum*-group** (part) (p. 362)

– Anterior and dorsal faces of the petiole node in profile meeting in an angle (Figs 78–84), a defined anterodorsal angle present. Eyes smaller, maximum diameter <0·26 × HW . ***flabellum*-group** (part) (p. 294)

25 Mandibles longitudinally striate *and* the anterior and dorsal faces of the petiole node meeting in a smooth continuous convexity, without an anterodorsal angle. . . . . . . ***quadridentatum*-group** (part) (p. 362)

– Mandibles smooth or striate; if the latter then a distinct anterodorsal angle developed which separates anterior and dorsal faces of petiole node 26

26 Mandibles usually sculptured. Hairs on dorsal alitrunk short, stout and blunt when present; if absent then eyes large, maximum diameter 0·29 × HW or more . . . . . . ***simillimum*-group** (part) (p. 303)

– Mandibles usually smooth. Hairs on dorsal alitrunk fine and acute when present; if absent then eyes with maximum diameter <0·29 × HW . . . . ***dumezi*-group** (part) (p. 344)

Of these 19 species-groups 10 are found only in the Ethiopian region. Five groups based on the region each have one or more tramp species which also occur elsewhere or have a few species which have spread to adjacent zoogeographical regions. Included here are members of the *simillimum-*, *grassii-*, *sericeiventre-*, *camerunense-*, and *setigerum*-groups. Of the few remaining species-groups three are based on the Ethiopian but have endemic species outside which do not occur in the Ethiopian region itself. The *weitzeckeri*-group, having 13 known species in the Ethiopian region, also has 4 endemic species in Madagascar; the *angulinode*-group has 8 African species and one other which is widely distributed in the Oriental and Indo-Australian regions; and the *bicarinatum*-group is fairly evenly distributed between the Ethiopian and the Oriental/Indo-Australian regions, with 9 endemic species in the former and 13 in the latter.

The final group, that of *tortuosum*, is virtually of world-wide distribution, with endemic species in all regions except the Palaearctic. The known species are distributed by region as follows: Ethiopian 2, Malagasy 7, Oriental 7, Indo-Australian 5, Australia 5, Nearctic 4. This is the only group with endemic species in the new world and its relatively large number of endemics in Madagascar and Australia suggests that it may have been one of the earliest groups in the genus to radiate widely.

The *weitzeckeri*-group

(Figs 1–12)

Antennae with 11 segments. Sting appendage spatulate. Mandibles variable, usually longitudinally striate but smooth in some species. Anterior clypeal margin notched or impressed medially (reduced or absent in very small species). Petiole in profile anteroposteriorly compressed, either a high narrow node or squamiform, the height of the tergal portion greater than the dorsal length. In dorsal view the petiole node or scale usually much broader than long (not in *edouardi*). Postpetiole often anteroposteriorly compressed, sometimes squamiform. In general both pedicel segments unsculptured but in some species sculpture present on one or both. Frontal carinae always strongly developed. Hairs on first gastral tergite not short and dense, usually not directed towards the midline of the sclerite. Dorsal (outer) surfaces of hind tibiae never having long projecting hairs, usually with short, fine subdecumbent to appressed pubescence.

With 13 known species this is the largest group of *Tetramorium* with 11-merous antennae in the Ethiopian region, and is very widely distributed within the region.

The group divides roughly into three complexes of related species. The first, which includes *flavithorax, muralti* and *occidentale*, are characterized by having the mandibles unsculptured, the antennal scrobes very strongly developed with well-defined margins all round them (Fig. 1) and the anterior portion divided into upper and lower compartments by a median carina; and by having very reduced sculpture on the head and alitrunk, which is mostly smooth and shining. The three species of this complex are restricted to the rain forest zones of west and central Africa and all nest in rotten stumps or dead wood in the leaf-litter layer. *T. flavithorax* is strongly bicoloured black and yellow and has the pronotum sculptured with longitudinal rugae, whilst the other two species are uniform black or blackish brown with the pronotum smooth. In *occidentale* the propodeum lacks dorsal carinae and the head has but a single median carina. Palp formula in this species is 4, 3. In *muralti* on the other hand the palp formula is 3, 3, the head has three carinae and propodeal carinae are present.

The two remaining complexes of this group have the mandibles usually striate (though this may be reduced in a couple of species), have the head and alitrunk strongly sculptured and have no defined ventral margin to the scrobes, this function usually being taken over by a series of longitudinal rugae which run above the eye (Figs 3, 4). Six of the ten species thus delimited have the petiole formed as a high, narrow node whilst the other four have the petiole scale-like. In profile the outline of these two forms of node may not seem radically different but in dorsal view the difference is obvious as the former complex shows a roughly transversely rectangular shape whilst the latter shows a very broad oval (compare Figs 10–12 and 7–9).

The complex in which the petiole is a high, narrow node includes *edouardi, pinnipilum, rogatum, schoutedeni, tersum* and *zonacaciae*. Three of these have very distinctive specialized pilosity; pectinate or pinnate in *pinnipilum*, clavate in *rogatum*, and broad, flattened and appressed in *zonacaciae*. The remainder have more normal pilosity and are separated on characters of sculpture, eye size etc. as noted in the key and the discussions of the species.

Finally, the four species with the petiole squamiform, *guineense, humbloti, sepultum* and *weitzeckeri*, fall into two species-pairs dependent upon the presence in *guineense* and *weitzeckeri* of gastral pilosity and its absence in the other two species.

The majority of the species in the last two complexes mentioned are savannah, grassland or montane forms nesting under stones or directly into the earth. Only a few are known from rain forest (*guineense, pinnipilum, rogatum*) where they nest in rotten wood in the leaf-litter layer.

The species of the last two complexes mentioned above show striking resemblances to ants of the *grassii-* and *squaminode*-groups and direct descent of the *weitzeckeri*-group members from one or both of these source-groups is a certainty. The only character separating them is the reduced antennomere count in *weitzeckeri* and its allies for the *grassii-* and *squaminode*-groups, although having 12-merous antennae, all have the spatulate sting appendage more typical of 11-merous forms. The problem is deciding whether all species of the *weitzeckeri*-group arose from only one of these groups or if some (the ones with high nodiform petiole) arose from the *grassii*-group whilst the rest (with squamiform petiole) arose from the *squaminode*-group. If only one group is claimed to be ancestral to *weitzeckeri* and its allies then it must be the *grassii*-group as the petiole in all its species is high nodiform. It can then be postulated that the petiole became more compressed until squamiform condition was achieved. Supporting this line of argument is the fact that *occidentale* and its allies have a petiole shape roughly intermediate between that found in the other two complexes (see Fig. 5).

On the other hand, if both the *grassii*-group and the *squaminode*-group are claimed as ancestral to different complexes of the *weitzeckeri*-group this means that the last-named is a compound group, the members of which are strongly convergent.

Tetramorium edouardi Forel

(Fig. 12)

Tetramorium (*Xyphomyrmex*) [sic] *edouardi* Forel, 1894: 82. Holotype worker, ETHIOPIA ('Südabessinien'): Harar (*Ilg*) (MHN, Geneva) [examined].

WORKER. TL 3·5–4·2, HL 0·88–1·00, HW 0·78–0·86, CI 85–89, SL 0·66–0·74, SI 85–89, PW 0·58–0·68, AL 1·02–1·18 (12 measured).

Mandibles striate, the anterior clypeal margin slightly notched medially, more distinct in some individuals than others but always present. Frontal carinae strong, weakly sinuate, surmounted by a raised ridge throughout their length and reaching back almost to the occipital margin. Scrobes narrow, without a defined ventral margin. Eyes quite large, their maximum diameter 0·21–0·24, about 0·25–0·27 × HW, much greater than the maximum width of the apical antennomere. Propodeal spines long and acute, the metapleural lobes low and broadly triangular, blunted in some. Node of petiole in dorsal view as long as or slightly longer than broad, in profile high nodiform, only slightly antero-posteriorly compressed. Dorsum of head regularly and sharply longitudinally rugose, the rugae widely spaced (8–10 between frontal carinae at level of eyes) and the spaces between them shining, with only very feeble ground-sculpture. A weak rugoreticulum is present occipitally but elsewhere cross-meshes are very sparse or absent. Dorsal alitrunk with spaced longitudinal rugae, often with scattered cross-meshes, particularly on the pronotum laterodorsally. Petiole with a sharply defined and distinct rugoreticulum dorsally, the postpetiole similarly sculptured but more faintly, and with the longitudinal component predominating. Gaster unsculptured and shining. All dorsal surfaces of head and body with numerous erect to suberect simple hairs, but these are absent from the appendages. Colour uniform mid-brown, the gaster darker in shade than the head and alitrunk, the appendages yellowish brown.

A savannah and grassland species closely related to *tersum*, *edouardi* forms a complex in the *weitzeckeri*-group together with *zonacaciae*, *rogatum*, *pinnipilum*, *schoutedeni* and *tersum*, which is characterized by the high, narrow-nodiform petiole, as opposed to the squamate condition encountered elsewhere in the group. Three of these are quickly separable from *edouardi* by characters of pilosity, where the main gastral hairs on the first tergite are reclinate/appressed in *zonacaciae*, clavate in *rogatum* and pectinate or pinnate in *pinnipilum*. In *schoutedeni* the mandibles are unsculptured and the eye relatively small (0·21 × HW as opposed to 0·25–0·27 × HW in *edouardi*).

T. tersum, the closest relative of *edouardi* may be separated by the following characters.

edouardi	*tersum*
Petiole node as long as or slightly longer than broad in dorsal view.	Petiole node distinctly much broader than long in dorsal view.
Antennal scapes longer, SI 83–87.	Antennal scapes shorter, SI 72–80.
Petiole dorsum with a strongly defined rugoreticulum.	Petiole dorsum without rugoreticulum.
Mandibles strongly striate.	Mandibles feebly or not striate.
Slightly smaller species, HW in range 0·76–0·88.	Slightly larger species, HW in range 0·88–0·98.

MATERIAL EXAMINED

Ghana: Legon (*G. Benson*). **Ivory Coast**: Lamto (*J. Lévieux*). **Cameroun**: Kumba (*H. Oldroyd*).

Tetramorium flavithorax (Santschi) **comb. et stat. n.**

Xiphomyrmex muralti st. *flavithorax* Santschi, 1914*a*: 369, fig. 31. Holotype worker, GHANA: Aburi (*F. Silvestri*) (NM, Basle) [examined].

[Note. The published name of this species is as above, but the data label on the holotype states '*Tetramorium* (*Xiphomyrmex*) *muralti* st. *flaviventris*'.]

WORKER. TL 2·1–2·3, HL 0·50–0·56, HW 0·48–0·52, CI 92–96, SL 0·32–0·38, SI 67–75, PW 0·36–0·42, AL 0·56–0·62 (20 measured).

Mandibles smooth and shining with scattered minute pits. Anterior clypeal margin entire or at most very feebly impressed medially. Frontal carinae long, sinuate, broadly separated and strongly developed, curving back and down near the occipital margin to form the posterior border of the scrobes. Antennal scrobes strongly developed, with acute dorsal and ventral margins and with a median longitudinal carina which runs at least to the level of the posterior margin of the eye and divides the scrobe into upper and lower compartments anteriorly. Eyes elongate, narrowing anteriorly, situated below the anterior half of the scrobe. Dorsal alitrunk evenly convex in profile, the sides separated from the dorsum by a distinct angular margination except on the anterior portion of the pronotum. Propodeal spines long and acute, the metapleural lobes broadly triangular. Petiole thickly squamiform, much broader than long in dorsal view and much higher than long in profile; anterior face of node in profile usually markedly concave. Node of postpetiole in profile cuneiform, usually acute apically but more rarely with the dorsum narrowly rounded. Clypeus with three longitudinal carinae, a median and one on each side. Dorsum of head usually unsculptured except for the distinct median carina, but in some specimens a weaker carina is present on each side of the median and very rarely one or two feeble short rugulae may also be present. Such secondary sculpture is usually restricted to the area of the dorsum in front of the midlength of the eyes. Dorsal alitrunk with a few fine longitudinal rugulae which are widely spaced; usually about 4–6 only are present on the promesonotum. Pedicel and gaster unsculptured, smooth. Elongate fine hairs present on all dorsal surfaces of head and body, but absent from appendages. Colour distinctive, with head, petiole, postpetiole and gaster black or blackish brown and the alitrunk, legs, antennae and mandibles clear yellow.

This small, strongly bicoloured species is confined to the rain forest zone of West Africa where it is sympatric with the similarly coloured *Triglyphothrix distincta* Bolton. Nests of *flavithorax* are constructed in rotten wood, either under the bark of rotten stumps or in logs embedded in the leaf-litter layer, usually under fairly dense shade.

The species *flavithorax, muralti* and *occidentale* form a close-knit complex within the *weitzeckeri*-group, characterized by their strongly developed antennal scrobes with strong posterior and ventral margins, their smooth mandibles and their strong reduction of sculpture on the head and alitrunk. *T. flavithorax* is quickly separated from both other species of the complex by being bicoloured (the other two being uniform black or blackish brown) and by having longitudinal rugular sculpture on the promesonotum which is absent in the other two species.

MATERIAL EXAMINED

Ivory Coast: Forêt de Tai (*T. Diomande*); Forêt de Bandama (*Gotwald & Schaefer*); Nzi Noua (*W. L. & D. E. Brown*); Banco Forest, Abidjan (*W. L. Brown*); Forêt d'Anguédedou (*W. L. Brown*). **Ghana**: Tafo (*B. Bolton*); Tafo (*M. Bigger*); Mampong (*P. M. Room*); Mampong (*D. Leston*); Kade (*D. Leston*); Mt Atewa (*B. Bolton*); Akosombo (*C. A. Collingwood*). **Nigeria**: Ibadan (*B. R. Critchley*); Ile-Ife (*J. T. Medler*).

Tetramorium guineense (Bernard) **comb. et stat. n.**
(Fig. 7)

Xyphomyrmex [sic] *weitzeckeri* subsp. *guineensis* Bernard, 1952: 251, fig. 14D. LECTOTYPE worker, GUINEA: '(Forêt de) Nion no 22, 700 m 15/4' (*Lamotte*) (MNHN, Paris), here designated [examined].

WORKER. TL 2·9–3·7, HL 0·70–0·92, HW 0·66–0·88, CI 95–100, SL 0·54–0·72, SI 79–85, PW 0·48–0·64, AL 0·80–1·10 (20 measured).

Mandibles coarsely longitudinally striate. Anterior clypeal margin with a median notch or impression which is usually strongly defined, less commonly otherwise. Frontal carinae strong anteriorly but becoming weaker behind the level of the eyes; occipitally scarcely stronger than the other cephalic sculpture, the flange surmounting the carina rapidly diminishing in height. Scrobes broad and shallow, without defined ventral borders. Eyes moderately sized, maximum diameter 0·16–0·20, about 0·22–0·24 × HW. Sides of alitrunk separated from dorsum by blunt angles on pronotum which are less conspicuous or absent on remainder of alitrunk. Metanotal groove slightly impressed when alitrunk viewed in profile. Propodeal spines long, strong and acute; metapleural lobes triangular, acute and usually slightly upcurved along their length. Petiole thickly squamiform, in dorsal view much broader than long, in profile much higher than long. Postpetiole in profile rounded, scarcely or not at all antero-posteriorly compressed, so that the postpetiole node is much thicker than that of the petiole. Head with widely spaced strong longitudinal rugae with few or no cross-meshes, without an occipital rugoreticulum. Spaces between the rugae and the scrobal area densely and coarsely reticulate-punctate, this sculpture very conspicuous. Dorsal alitrunk coarsely and predominantly longitudinally rugose, the spaces between rugae smooth or with only faint punctulation, contrasting strongly with the dense punctate ground-sculpture of the head. Petiole, postpetiole and gaster unsculptured, smooth and shining. All dorsal surfaces of head and body with numerous elongate simple hairs, the scapes and tibiae only with decumbent to appressed pubescence. Colour deep glossy brown or reddish brown, often with the gaster darker, sometimes the latter nearly black.

Within the *weitzeckeri*-group *guineense* occupies a complex of species which also includes *sepultum, humbloti* and *weitzeckeri* itself. These four species are characterized by having the petiole squamiform and the mandibles striate. Of them *sepultum* and *humbloti* form a close species-pair in which pilosity is absent from the first gastral tergite and *guineense* and *weitzeckeri* form a pair in which it is present. The two last-named may be separated by the presence in *guineense* of very coarse reticulate-punctate ground-sculpture on the head and filling the scrobal area, which is absent in *weitzeckeri*, and also by the shape of the postpetiole. In *weitzeckeri* the postpetiole is at least as strongly anteroposteriorly compressed as the petiole so that in profile the two are of about equal thickness. In *guineense* on the other hand the postpetiole is little or not compressed so that in profile the postpetiole is conspicuously thicker than the petiole (compare Figs 7 and 8).

The ranges of these two species appear to be mutually exclusive as *guineense* occurs only in the rain forest zones of West and Central Africa whilst *weitzeckeri* ranges widely through the dryer woodlands and forests of southern and eastern Africa.

Nests of *guineense* are constructed in rotten stumps or dead logs which still have adherent bark, and workers forage freely in the leaf-litter layer. They are predaceous, taking any soft-bodied arthropods, and at Tafo in Ghana workers appeared rapidly on the scene of a disturbed *Pheidole* nest, carrying off the brood and even an occasional worker of the *Pheidole* species.

MATERIAL EXAMINED

Liberia: Reputa (*W. M. Mann*). **Ivory Coast**: Divo (*L. Brader*); Forêt de Tai (*T. Diomande*). **Ghana**: Tafo (*B. Bolton*); Begoro (*C. A. Collingwood*); Mt Atewa (*C. A. Collingwood*); Kibi (*D. Leston*); Kade (*J. Majer*). **Gabon**: Ile aux Singes (*J. A. Barra*). **Nigeria**: Gambari (*B. Bolton*). **Zaire**: Ituri Forest, vic. Epulu (*T. Gregg*).

Tetramorium humbloti Forel
(Fig. 9)

Tetramorium (*Xiphomyrmex*) *humbloti* Forel, 1891: 154, pl. 4, fig. 12. Syntype workers, COMORO Is.: Grand Comoro I., Ngasiya (*L. Humblot*) (MHN, Geneva) [examined].

Tetramorium (*Xiphomyrmex*) *humbloti* var. *pembensis* Forel, 1907*a*: 83. Syntype females and males, TANZANIA: Pemba I. (*Voeltzkow*) (MHN, Geneva) [examined]. **Syn. n.**

Tetramorium (*Xiphomyrmex*) *humblotii* var. *victoriensis* Forel, 1913*b*: 120. Syntype workers, RHODESIA: Victoria Falls, 17.ii.1912 (*G. Arnold*) (BMNH) [examined]. **Syn. n.**

WORKER. TL 3·4–4·1, HL 0·80–0·94, HW 0·74–0·88, CI 92–95, SL 0·56–0·72, SI 74–84, PW 0·54–0·66, AL 0·88–1·08 (30 measured).

Mandibles longitudinally striate. Anterior clypeal margin impressed or notched medially, only faintly so in some individuals. Frontal carinae strongly developed, becoming weaker behind the level of the eyes but reaching back almost to the occiput. Antennal scrobes represented by an impressed area bounded above by the frontal carinae but without a differentiated ventral margin. Alitrunk in profile usually with the metanotal groove slightly impressed and the anteriormost part of the propodeal dorsum on a slightly lower level than that of the posterior mesonotum so that a small step-down separates the two (Fig. 9). In large workers this character is usually obvious but tends to be undeveloped in workers at the lower end of the size range given above. Propodeal dorsum in profile sloping strongly downwards (concave in some individuals) from the metanotal groove to the bases of the stout spines. Metapleural lobes quite broadly triangular, acute, generally slightly upcurved. Both petiole and postpetiole thick squamiform, strongly anteroposteriorly compressed. In profile both nodes narrow and much higher than long, in dorsal view markedly transverse, much broader than long. Head with spaced out longitudinal rugae, sometimes with a few scattered cross-meshes and always with the spaces between the rugae reticulate-punctate, generally strongly so. This cephalic sculpture tends to fade out occipitally, being much weaker there than in the centre of the dorsum. Dorsal alitrunk either unsculptured, completely smooth and shining, or at most with some weak superficial punctulation on the pronotum or mesonotum. Pedicel segments and gaster unsculptured and shining. Dorsum of head with sparse, fine, erect hairs. Pilosity of dorsal alitrunk variable, usually without standing hairs at all but rarely with up to six hairs: one pair each on pronotum, mesonotum and propodeum. Pedicel segments and first gastral tergite without hairs, but hairs present on tergites following the first. Scapes and tibiae with fine appressed pubescence only. Colour varying from light to dark brown, the gaster sometimes darker than the head and alitrunk.

T. humbloti is the most widely distributed member of a triad of closely related species within the *weitzeckeri*-complex in which the petiole node is squamiform. The other two species are *bessoni* Forel of the Malagasy region (see Bolton, 1979: 141) and *sepultum*, at present known only from Swaziland. Within the *weitzeckeri*-group the squamate petiole, lack of hairs on the first gastral tergite and unsculptured dorsal alitrunk quickly separate *humbloti* from its relatives and from the closely related *sepultum* in which the alitrunk is rugose and has numerous (more than 10) erect hairs.

The range of *humbloti* includes eastern and southern Africa and the Comoro Islands of the Malagasy region, but it has not yet been found on the island of Madagascar itself.

MATERIAL EXAMINED

Zaire: Elisabethville, Pweto (*Gérard*). **Tanzania**: Mt Meru (*E. S. Ross & R. E. Leech*). **Rhodesia**: Victoria Falls (*G. Arnold*); Victoria Falls (*W. L. Brown*); Umtali (*G. Arnold*); Sawmills (*G. Arnold*); Caskel (*G. Arnold*). **South West Africa**: Kabulabula (*Vernay-Lang*). **South Africa**: no loc. (*H. Swale*).

Tetramorium muralti Forel

Tetramorium (*Xiphomyrmex*) *muralti* Forel, 1910*b*: 429. Holotype worker, CAMEROUN: no loc. (*L. von Muralt*) (MHN, Geneva) [examined].

Xiphomyrmex muralti var. *trilineata* Santschi, 1919*b*: 88. Syntype worker, female, GHANA: Aburi, 1913 (*F. Silvestri*) (NM, Basle) [examined]. **Syn. n.**

WORKER. TL 2·1–2·3, HL 0·50–0·56, HW 0·48–0·54, CI 92–97, SL 0·36–0·38, SI 70–75, PW 0·36–0·40, AL 0·56–0·64 (10 measured).

Mandibles smooth and shining with scattered minute pits; anterior clypeal margin entire, without a median impression. Frontal carinae strongly developed, sinuate, curving back and down close to the occiput to form the posterior margins of the scrobes. Frontal carinae widely separated, their maximum distance apart at the level of the eyes about 0·75 × HW. Antennal scrobes strongly developed and deep, demarcated by sharp margins all round and with a short median carina anteriorly which extends back to the level of the eye and divides the anterior part of the scrobe into upper and lower compartments. Eyes moderate, maximum diameter around 0·15 (about 0·25 × HW), the anterior portion of the eye narrowed and drawn out in an anteroventral direction. Alitrunk in dorsal view with bluntly angular margination between sides and dorsum, in profile evenly convex above. Propodeal spines long and acute, the metapleural lobes low and triangular. Petiole squamiform, in dorsal view much broader than long, in profile much higher than long; the anterior face commonly slightly concave in profile. Postpetiole reduced, low cuneiform, much lower than the petiole. Head unsculptured except for three longitudinal carinae, the median and one on each side of it, which arise on the clypeus and run to the occiput. Rarely one or both lateral carinae may be broken or interrupted on the vertex. Promesonotal dorsum smooth and shining, usually unsculptured but sometimes with two feeble short rugulae on the pronotum anteriorly. Propodeal dorsum unsculptured except for a pair of weak longitudinal carinae which arise at the inner bases of the propodeal spines and run forwards, sometimes extending onto the posterior portion of the mesonotum. Pedicel segments and gaster unsculptured. Fine erect hairs present on all dorsal surfaces of the body but the appendages only with short appressed pubescence. Colour uniform blackish brown to black, the appendages lighter, yellow or yellowish brown; sometimes the tibiae much lighter than the rest of the leg.

A small forest-inhabiting species which nests in rotten wood in the leaf-litter layer, *muralti* is closely related to *flavithorax* and *occidentale* in its possession of smooth mandibles, strongly developed scrobes and squamiform petiole. It is separated from *flavithorax* by colour and by the fact that the dorsal alitrunk has strongly developed sculpture, and from *occidentale* by the presence in that species of only a single cephalic carina (the median), and its lack of carinae on the propodeal dorsum.

A single worker of *muralti* dissected showed a palp formula of 3, 3 as opposed to 4, 3 in its closest relatives, but not enough workers are available for dissection to find if this character is consistent in *muralti*.

MATERIAL EXAMINED

Ivory Coast: Banco Forest, Abidjan (*W. L. Brown*); Divo (*C. A. Collingwood*). **Ghana**: Mampong (*P. M. Room*); Kukurantumi (*C. A. Collingwood*).

Tetramorium occidentale (Santschi) **comb. n.**
(Figs 1, 2, 5)

Xiphomyrmex occidentalis Santschi, 1916*b*: 50, fig. 1. Holotype worker, CAMEROUN (NM, Basle) [examined].

Xiphomyrmex occidentalis subsp. *akengensis* Wheeler, 1922: 194. Syntype workers, ZAIRE: Akenge (*Lang & Chapin*) (MCZ, Cambridge; USNM, Washington) [examined]. **Syn. n.**

Xiphomyrmex insularis Menozzi, 1924: 223, fig. 4. Syntype workers, PRINCIPE I.: Roça Infante Don Henrique [or Enrique], 100–300 m, 1.iii.1901 (*L. Fea*) (IE, Bologna) [examined]. **Syn. n.**

WORKER. TL 2·3–3·3, HL 0·54–0·86, HW 0·50–0·82, CI 91–98, SL 0·36–0·58, SI 64–73, PW 0·38–0·56, AL 0·62–0·92 (30 measured).

Mandibles smooth and shining with scattered small pits; anterior clypeal margin with a small notch or impression medially. Frontal carinae strongly developed and sinuate but not approaching the occipital margin, ending instead at the level of the end of the scrobe. (Unlike the related *flavithorax* and *muralti* the frontal carinae in *occidentale* do not curve back and down posteriorly to form the posterior margin of the antennal scrobe.) Antennal scrobes broad and conspicuous, bounded above by the frontal carinae and below by a carina which runs above the eye, but without a carinate posterior margin; bounded posteriorly merely by the impression which it makes in the head. Anterior portion of scrobe with a short median carina which divides it into upper and lower compartments. Propodeal spines stout and acute, metapleural lobes triangular and acute. Petiole in profile thickly squamiform, usually with the anterior face somewhat concave but always with a differentiated short dorsal surface which may be flat or sloping. In dorsal view the petiole always much broader than long, in profile much higher than long. Postpetiole in profile usually thick cuneiform, narrowly rounded above, but lower and more broadly rounded in some specimens. Head usually completely smooth except for the median carina which runs the whole length of the dorsum from clypeus to occiput. A lateral pair of carinae are present on the clypeus which may be extended onto the dorsum of the head as far back as the level of the eyes. Very rarely one or two extra faint rugulae appear on each side of the midline. Dorsal alitrunk usually completely smooth, uncommonly with one or two minute rugulae on the extreme anterior pronotum. Pedicel segments and gaster unsculptured. Fine erect or suberect hairs present on all dorsal surfaces of head and body but appendages with fine decumbent or appressed pubescence only. Colour uniform dark brown to black, the appendages lighter, sometimes much lighter.

Like its close relatives *flavithorax* and *muralti* this species nests in rotten stumps and logs in rain forest areas. *T. occidentale* has, however, a wider known range than either of these two, being found in Zaire and Angola as well as in West Africa. The shining workers of *occidentale* are quite common in thickly forested areas of Ghana and berlese funnel samples from such areas usually produce one or two of them, indicating that they probably forage singly in the leaf-litter.

Of the closely related species in the group which have smooth mandibles and strongly developed antennal scrobes, the distinctive black and yellow colour pattern and presence of alitrunkal sculpture will immediately separate *flavithorax* from *occidentale*, whilst differences in cephalic sculpture and the presence of propodeal carinae will differentiate *muralti* from *occidentale*.

The material of *occidentale* examined during the course of this study showed a size range remarkable even for a tetramoriine, and set me wondering if perhaps the name conceals more than one valid species. Suffice to say for the present that the samples are not divisible on size as the ranges given above are continuous and any attempt to draw a line between one size and another will be purely arbitrary. Following on this, I could find no consistent morphological detail useful in splitting the material and so have left all the samples as representing a single species for the time being.

MATERIAL EXAMINED

Ivory Coast: Banco Forest (*W. L. Brown*); Divo (*C. A. Collingwood*). **Ghana:** Mampong (*D. Leston*); Prestea Forest (*C. A. Collingwood*); Tafo (*D. Leston*); Tafo (*B. Bolton*); Pankese (*C. A. Collingwood*); Mt Atewa (*C. A. Collingwood*); Mt Atewa (*B. Bolton*). **Cameroun:** Yaoundé (*E. S. Ross & K. Lorenzen*); Muyuka (*B. Malkin*). **Zaire:** Ituri Forest (*N. A. Weber*); Penghe (*J. Bequaert*); Luebo, Kamaiembi (*H. Schouteden*); Ngombe (*H. Schouteden*). **Angola:** R. Kahingo (*Mwaoka*); Dundo (*Luna de Carvalho*).

***Tetramorium pinnipilum* sp. n.**

(Figs 3, 6)

HOLOTYPE WORKER. TL 3·4, HL 0·82, HW 0·78, CI 95, SL 0·60, SI 77, PW 0·58, AL 0·98.

Mandibles longitudinally striate, anterior clypeal margin with a median notch or impression. Frontal carinae strong, surmounted by a raised rim or flange and reaching back to the occiput. Antennal scrobes a narrow elongate shallow impression bounded above by the frontal carinae and below by the uppermost of a series of longitudinal rugae which run the length of the head; the uppermost of these rugae slightly more strongly developed than those running just above the eye, at least anteriorly. Maximum diameter of eye *c.* 0·18, about 0·23 × HW. Propodeal spines elongate, stout and acute; metapleural lobes short and broad basally, acutely triangular. Petiole high-nodiform, in profile much higher than long, with the anterior and posterior faces about parallel and the dorsum evenly but shallowly convex. Postpetiole in profile with the node thickly squamiform in its dorsal half, this portion much narrower than the petiole node. In dorsal view both nodes distinctly much broader than long. Dorsum of head with fairly regular longitudinal rugosity, 11–12 present between the frontal carinae at the level of the eyes. Cross-meshes between these rugae absent except on occiput where a weak reticulum is present. Spaces between the rugae with inconspicuous feeble punctulate ground-sculpture. Dorsal alitrunk strongly and irregularly longitudinally rugose, the interspaces with faint ground-sculpture. Pedicel segments and gaster unsculptured. Long erect to suberect hairs numerous on all dorsal surfaces of the head and body, the vast majority of these hairs pinnate, pectinate or even plumose in their apical halves. Antennal scapes and tibiae with quite long fine pubescence which is subdecumbent to decumbent. Colour orange-brown, the gaster blackish brown.

PARATYPE WORKERS. As holotype in all respects, their range of dimensions TL 3·2–3·6, HL 0·74–0·84, HW 0·68–0·78, CI 90–95, SL 0·56–0·62, SI 76–83, PW 0·54–0·58, AL 0·86–1·00. Maximum diameter of eye 0·17–0·19, about 0·21–0.23 × HW (10 measured).

Holotype worker, **Angola**: Salazar I.I.A.A., 9–15.iii.1972 (A 26) (*P. M. Hammond*) (BMNH).

Paratypes. Ten workers with same data as holotype (BMNH; MCZ, Cambridge; NM, Basle; MHN, Geneva).

The single most obvious diagnostic character of this species is the bizarre pilosity, which renders it immediately recognizable and distinguishes it from all other *Tetramorium* with 11-merous antennae in the Ethiopian region. The affinities of *pinnipilum* lie with a small complex of species in the *weitzeckeri*-group which are discussed under *edouardi*.

Tetramorium rogatum sp. n.

(Fig. 10)

HOLOTYPE WORKER. TL 3·6, HL 0·84, HW 0·76, CI 90, SL 0·62, SI 82, PW 0·60, AL 0·98.

Mandibles coarsely longitudinally striate, anterior clypeal margin with a small median notch. Frontal carinae strongly developed, reaching back to occiput, weakly sinuate along their length and surmounted by a raised rim or flange which is highest anteriorly but becoming distinctly lower behind the level of the eyes. Antennal scrobe a narrow shallow groove on the side of the head, bounded above by the frontal carinae and capable of accommodating the scape. The lower margin of the narrow scrobe is delimited anteriorly by a longitudinal ruga which fades out behind the level of the eyes. Eyes moderate, maximum diameter 0·18, about 0·23 × HW, very slightly longer than the maximum width of the apical antennomere (about 0·14). Propodeal spines long and acute, somewhat upcurved along their length; metapleural lobes triangular and acute. Node of petiole in profile high-rectangular, higher than long with roughly parallel vertical anterior and posterior faces with a shallowly but evenly convex dorsum. Node of postpetiole in profile rounded, more strongly convex than the petiole dorsally. Petiole node in dorsal view broader than long. Dorsum of head finely reticulate-rugulose, with the longitudinal component more strongly developed than the cross-meshes, the latter faint in places. Clypeus with a fine, broad-meshed rugoreticulum. Dorsal surfaces of alitrunk and pedicel segments longitudinally rugulose, the former with sparse cross-meshes. Ground-sculpture everywhere between the rugae a very feeble punctulation, almost effaced in places. Gaster unsculptured. All dorsal surfaces of head and body with abundant hairs, those on the head very dense and curved inwards towards the midline. Long hairs on first gastral tergite, and to a lesser extent those on the pedicel segments and alitrunk, are clavate or strongly thickened and truncated apically. Some of the shorter cephalic hairs are similarly modified. Scapes and tibiae only with short, fine subdecumbent to decumbent pubescence. Colour uniform mid-brown.

Holotype worker, **Angola**: Bruco, 26.ii.–2.iii.1972 (A 11) (*P. M. Hammond*) (BMNH).

Of the species in the *weitzeckeri*-group as presently understood, only three have specialized pilosity. These are *pinnipilum* with numerous pectinate or pinnate hairs, *zonacaciae* with flattened appressed hairs, and *rogatum* with claviform hairs as described above.

Tetramorium schoutedeni Santschi

Tetramorium schoutedeni Santschi, 1924: 213, fig. 9a. Holotype worker, ZAIRE: Kunungu, 6.iv.1921 (*H. Schouteden*) (MRAC, Tervuren) [examined].

WORKER. TL 3·7, HL 0·90, HW 0·88, CI 98, SL 0·72, SI 82, PW 0·62, AL 1·04.

Mandibles smooth and shining, unsculptured except for minute hair pits. Anterior clypeal margin impressed medially. Frontal carinae strong, sinuate, extending back almost to the occipital corners and surmounted by a raised semitranslucent flange or ridge. Antennal scrobes broad and shallow. Eyes relatively small, maximum diameter *c.* 0·19, about 0·21 × HW. In full-face view the occipital margin of the head broadly and deeply concave medially, the sides convex. Propodeum armed with a pair of long, strong spines; in profile the declivity below the spines almost vertical to the triangular metapleural lobes. Petiole node in profile vertically rectangular, much higher than the dorsal length and with the anterior and posterior faces more or less parallel. Node of postpetiole antero-posteriorly compressed, narrower than that of petiole. Petiole node in dorsal view roughly transversely rectangular and distinctly broader than long. Dorsum of head longitudinally rugulose with feeble anastomoses occipitally. Spaces between rugulae with fine punctulate ground-sculpture. Pronotal dorsum coarsely rugose with some reticulation laterally, this sculpture becoming less intense and less sharply defined posteriorly on the dorsum of the alitrunk. Petiole with a few strong longitudinal rugae laterally, postpetiole and gaster unsculptured. All dorsal surfaces of head and body with numerous erect to suberect long hairs, the longest of which are about equal to the maximum diameter of the eye. Colour orange-brown, the gaster much darker brown.

The funicular segments of both antennae are missing from the holotype, which probably accounts for Santschi's placement of *schoutedeni* in *Tetramorium* rather than in *Xiphomyrmex*. Consideration of species-group characters, however, places *schoutedeni* firmly among the relatives of *weitzeckeri*, where it is closest to *tersum*. The characters given in the key will quickly separate the two species.

Tetramorium sepultum sp. n.

HOLOTYPE WORKER. TL 3·5, HL 0·86, HW 0·82, CI 95, SL 0·66, SI 80, PW 0·62, AL 1·02.

Mandibles longitudinally striate, anterior clypeal margin with a slight median impression. Frontal carinae elongate, reaching almost to the occipital margin and forming the upper borders of the weak antennal scrobes which are no more than a shallow impression. Eyes of moderate size, maximum diameter *c*. 0·18, about 0·22 × HW. Alitrunk in profile with metanotal groove slightly impressed, the anteriormost portion of the propodeal dorsum slightly depressed below the level of the posterior mesonotum. Behind this the propodeal dorsum slopes strongly to the propodeal spines which are strong, thick and acute. Metapleural lobes acutely triangular. Petiole and postpetiole thickly squamiform, in profile much higher than long and in dorsal view much broader than long. Head with spaced-out longitudinal rugae which are quite regular, 8–10 being present between the frontal carinae at the level of the eyes. Spaces between the rugae filled with a fine but quite conspicuous superficial punctulation. Dorsal alitrunk irregularly rugose, the rugae predominantly longitudinal but with a number of scattered cross-meshes; spaces between rugae glossy but very finely punctulate. Pedicel segments and gaster unsculptured, smooth and shiny. Dorsum of head and alitrunk with numerous erect or suberect hairs, many of which are blunt apically. Petiole and postpetiole each with one or two pairs of similar blunted hairs but the first gastral tergite without hairs, having only very scattered, minute, appressed pubescence. Gastral segments behind the first with hairs similar to those on the alitrunk. Scapes and tibiae with short decumbent or appressed pubescence only. Colour uniform brown.

PARATYPE WORKERS. As holotype, their dimensions TL 3·4–3·6, HL 0·84–0·88, HW 0·78–0·84, CI 92–95, SL 0·64–0·68, SI 80–82, PW 0·60–0·64, AL 0·98–1·06 (3 measured).

Holotype worker, **Swaziland**: 2–3 miles [3–5 km] S. of Mbabane, 2–4.ii.1962 (*R. L. Ghent*) (MCZ, Cambridge).

Paratypes. 3 workers with same data as holotype (MCZ, Cambridge; BMNH).

The closest relative of *humbloti* in the Ethiopian region, *sepultum* shares most of the characters of that species, including the diagnostic lack of hairs on the first gastral tergite which separates these two species from all others with 11-merous antennae in the region. The two are separated by the presence of rugose sculpture on the alitrunk in *sepultum*, absent in *humbloti*, and by the density of pilosity on the alitrunk whereby *sepultum* has about 14–16 hairs whilst *humbloti* has only 6 at most (usually none).

A third species, related to *humbloti* and *sepultum*, is *bessoni* of the Malagasy region, discussed in a previous part of this study (Bolton, 1979).

Tetramorium tersum Santschi

(Figs 4, 11)

Tetramorium tersum Santschi, 1910*b*: 357, fig, Holotype worker, KENYA: Rift Valley, Naivasha, 1904 (*Ch. Alluaud*) (MNHN, Paris) [examined].

Tetramorium (*Xiphomyrmex*) *kivuense* Stitz, 1911: 386, fig. 6. Holotype worker, ZAIRE: Lake Kivu, Kwidschwi I., 1907–08 (*Mecklenburg*) (MNHU, Berlin) [examined]. **Syn. n.**

Xiphomyrmex kivuense st. *atrinodis* Santschi, 1928*a*: 208. Holotype worker, KENYA: Naivasha, 1900 m st., 14.xii.1911 (*Alluaud & Jeannel*) (NM, Basle) [examined]. **Syn. n.**

WORKER. TL 4·5–4·8, HL 0·98–1·04, HW 0·88–0·98, CI 90–98, SL 0·70–0·74, SI 72–80, PW 0·66–0·72, AL 1·10–1·24 (12 measured).

Mandibles usually finely longitudinally striate but in a few individuals this sculpture almost effaced. Anterior clypeal margin with a shallow median impression. Frontal carinae strongly developed, sinuate, extending almost to the occipital margin and surmounted by a narrow rim or flange. Antennal scrobes narrow and shallow, bounded above by the frontal carinae and below by a series of longitudinal rugae which run above the eyes; scrobes scarcely capable of accommodating the scapes. Eyes large, their maximum diameter 0·23–0·27, about 0·26–0·29 × HW and with 13–15 ommatidia in the greatest diameter. With the alitrunk in profile the metanotal groove impressed and the dorsum of the propodeum immediately behind the groove raised into a low but sharp peak which is seen as a transverse welt in dorsal view. Propodeal spines long and acute, narrow and with a tendency to be slightly upcurved along their length. Metapleural lobes low and triangular. Petiole in profile with a high narrow node, the posterodorsal angle more broadly rounded than the anterodorsal and the dorsum sloping slightly downwards posteriorly. In dorsal view the petiole node distinctly broader than long. Postpetiole in profile lower than the petiole and more broadly rounded above. Dorsum of head with fine but quite sharply defined widely spaced longitudinal rugae, the spaces between which are glossy with only faint patchy superficial ground-sculpture. The rugae may form a few anastomoses occipitally but a rugoreticulum is never developed. Dorsal alitrunk rugose, predominantly longitudinal but usually with some cross-meshes and generally with traces of a reticulum on the anterior laterodorsal portion of the pronotum. Dorsal surfaces of pedicel segments usually with traces of rugulose sculpture but in some these are partially or mostly effaced. Gaster unsculptured. All dorsal surfaces of head and body with numerous hairs, those on the first gastral tergite tending to be suberect to subdecumbent and in general slightly shorter than those on the dorsal alitrunk. Scapes and tibiae with short decumbent to appressed pubescence only. Colour a uniform glossy dark brown.

T. tersum appears to be uncommon but quite widely distributed in eastern Africa, especially in mountainous or upland areas.

The closest relative of *tersum* in the *weitzeckeri*-group is *edouardi* and the separation of these species is discussed under the last-named species.

MATERIAL EXAMINED

Ethiopia: Mt Damota (*H. Scott*); Mt Chillalo (*H. Scott*). **Tanzania**: Msinsa, Kitingiri (*O. W. Richards*).

Tetramorium weitzeckeri Emery

(Fig. 8)

Tetramorium (*Xiphomyrmex*) *weitzeckeri* Emery, 1895: 39. Holotype worker, SOUTH AFRICA: Natal, Verulam (*Weitzecker*) (MCSN, Genoa) [examined].

Tetramorium (*Xiphomyrmex*) *escherichi* Forel, 1910*c*: 259. Syntype workers, female, ETHIOPIA: Eritrea, Ghinda, Nefasit (*Escherich*) (BMNH; MCZ, Cambridge; MHN, Geneva; USNM, Washington) [examined]. **Syn. n.**

Tetramorium (*Xiphomyrmex*) *ebeninum* Arnold, 1926: 277, fig. 80. Syntype workers, SOUTH AFRICA: Natal, Durban, 27.ix.1918 (*G. Arnold*) (BMNH) [examined]. **Syn. n.**

Xiphomyrmex weitzaeckeri [sic] var. *nigellus* Santschi, 1932: 389. Syntype worker, female, RHODESIA: Vumba Mts, 5700 ft [1740 m], 2–15.ii.1921 (*G. Arnold*) (NM, Basle) [examined]. **Syn. n.**

Xiphomyrmex weitzeckeri subsp. *edithae* Weber, 1943: 375. Holotype worker, SUDAN: Imatong Mts, 6000 ft [1830 m], 2.viii.1939, no. 1405 (*N. A. Weber*) (MCZ, Cambridge) [examined]. **Syn. n.**

WORKER. TL 3·0–4·1, HL 0·62–0·98, HW 0·60–0·96, CI 91–98, SL 0·44–0·76, SI 72–85, PW 0·44–0·70, AL 0·72–1·20 (30 measured).

Mandibles longitudinally striate, usually coarsely so but only faintly in some smaller individuals. Anterior clypeal margin with a feeble median impression. Frontal carinae strong, reaching back almost to the occipital margin and surmounted by a rim or flange which becomes weaker behind the eyes. Antennal scrobes narrow and shallow, without a defined ventral margin. With the alitrunk in profile the metanotal groove impressed. Propodeal spines stout and acute, the metapleural lobes acutely triangular. Both petiole and postpetiole squamiform, in profile much higher than long and in dorsal view much broader than long.

The postpetiole is at least as strongly squamate as the petiole and often is more strongly so, so that in profile the postpetiole is at most as thick as but usually narrower than the petiole. Head longitudinally rugose dorsally, the rugae spaced out and the gaps between them shining, with an almost effaced superficial punctulation, better developed in some specimens than in others but generally indistinct. Dorsal alitrunk longitudinally rugose, often with cross-meshes on the pronotum, especially in larger individuals. Pedicel segments and gaster unsculptured. All dorsal surfaces of head and body with erect or suberect hairs which are usually numerous and long, but in some populations hairs may be quite short or may be sparse, particularly on the first gastral tergite. Scapes and tibiae only with fine decumbent to appressed pubescence. Colour brown, varying from light brown to blackish brown and usually with the gaster darker in shade than the head and alitrunk.

Of the species of *Tetramorium* in which the antennae are 11-segmented *weitzeckeri* is certainly the most common in eastern and southern Africa and also occurs in parts of central Africa. It is one of the most variable of African tetramoriines as regards size, pilosity and density and intensity of sculpture. This variation may eventually show consistent differences which allow the material to be split into two or more species when more series have been collected and examined closely. In this study I originally considered splitting off the more westerly populations (from Angola and Gabon) as a separate species as on the whole they tended to be smaller, more shining and less coarsely sculptured than samples from southern and eastern Africa, but eventually I came to the conclusion that such a course of action could not be justified at present as collections from intervening areas are non-existent and also because a few specimens from Sudan showed a similar pattern. Suffice to say for the moment that I am uneasy about the concept of *weitzeckeri* as it now stands as a single species, but more material is required before a detailed investigation can be undertaken. Finally, it should be pointed out that my present opinion is that all the names placed in the above synonymy do represent a single species, and the populations which I suspect as being separable have not previously been described.

MATERIAL EXAMINED

Sudan: Torit (*Myers*); Mt Nelichu (*Myers*); Khor Aba (*N. A. Weber*); Imatong Mts (*N. A. Weber*). **Uganda**: Ft Portal (*N. A. Weber*). **Kenya**: no loc. (*N. A. Weber*). **Tanzania**: Dar-es-Salaam (*N. L. H. Krauss*). **Central African Empire**: Haut Mbomu (*N. A. Weber*). **Gabon**: Plateau d'Ipassa (*J. A. Barra*). **Zaire**: W. side Ruwenzori (*N. A. Weber*); Ituri, Beni-Irumu (*N. A. Weber*); Elisabethville (*J. Bequaert*); Haut Uelé, Moto (*L. Burgeon*). **Angola**: R. Kamauji (?); Bruco (*P. M. Hammond*); Salazar (*P. M. Hammond*); Gabela (*P. M. Hammond*). **Zambia**: nr Lusaka (*M. Bingham*). **Rhodesia**: Chirinda For. (*G. Arnold*); Vumba Mts (*G. Arnold*); Vumba Mts (*W. L. Brown*); Hope Fountain (*G. Arnold*); Redbank (*G. Arnold*); Bulawayo (*G. Arnold*); Zimbabwe (*E. S. Ross & R. E. Leech*); Rusape (*E. S. Ross & R. E. Leech*); Cecil Kop (*W. L. Brown*). **Swaziland**: Mbabane (*R. L. Ghent*). **South Africa**: Natal, Umhlanga (*G. Arnold*); Natal, Durban (*G. Arnold*); Durban (*C. B. Cooper*); Pietermaritzburg (*E. S. Ross & R. E. Leech*); Orange Free State, Bothaville (*H. Brauns*); Natal, Zululand, Dukuduku For. (*W. L. & D. E. Brown*).

Tetramorium zonacaciae (Weber) comb. n.

Xiphomyrmex zonacaciae Weber, 1943: 376, pl. 16, fig. 34. Syntype workers, SUDAN: Imatong Mts, 7100 ft [2160 m], 25.vii.1939, no. 1315 (*N. A. Weber*) (MCZ, Cambridge) [examined].

WORKER. TL 3·4–3·8, HL 0·80–0·92, HW 0·78–0·86, CI 93–98, SL 0·60–0·74, SI 77–85, PW 0·54–0·62, AL 0·96–1·04 (12 measured).

Mandibles longitudinally striate, anterior clypeal margin with a slight median impression. Frontal carinae reaching back almost to occiput, sinuate and surmounted by a narrow rim or flange, but this not so strongly developed as in related species. Antennal scrobes a narrow shallow groove, bounded above by the frontal carinae but without differentiated ventral margins. Maximum diameter of eye 0·20–0·22, about 0·23–0·25 × HW. Alitrunk in profile with metanotal groove impressed, the propodeal dorsum immediately behind the groove commonly raised into a low prominence or welt, but the degree of development of this prominence varying from series to series. Propodeal spines stout and acute, metapleural lobes low and quite broadly triangular. Petiole high nodiform, higher than long in profile with vertical, roughly parallel anterior and posterior faces. Posterodorsal angle lower and more broadly rounded than anterodorsal so that the weakly convex dorsal surface slopes downwards slightly from front to back. In dorsal view petiole node distinctly broader than long. Dorsum of head finely and quite regularly longitudinally rugose, without cross-meshes, the rugae separated by shining spaces which are unsculptured or which at most show a feeble punctulation. Occipitally the rugae may have a few anastomoses but a reticulum is never developed. Dorsal alitrunk glossy, with predominantly longitudinal or sometimes quite disorganized rugosity. Spaces between the rugae smooth or with very feeble superficial sculpture. Pedicel segments usually showing vestiges of faint rugosity dorsally but this is effaced in some individuals. Gaster unsculptured. Head and body with numerous hairs which, except for some on the frontal carinae and gastral apex, are all decumbent or appressed. On the head and alitrunk the decumbent/appressed hairs are directed towards the midline. On the first gastral tergite the hairs are thick, dorsoventrally flattened and blunt apically, directed towards a point on the midline posterior to their point of origin. Colour medium to dark brown, sometimes with gaster darker than alitrunk and head.

This species, with its very distinctive pilosity, appears to be restricted to the northern half of east Africa. It is related to *edouardi* and *versum* but these species do not have the specialized pilosity seen in *zonacaciae*.

MATERIAL EXAMINED

Sudan: Equatoria (*N. A. Weber*). **Uganda**: Fort Portal (*N. A. Weber*); Mt Elgon (*J. Ford*). **Rwanda**: Astrida (*E. S. Ross & R. E. Leech*). **Zaire**: Burunga (*J. Bequaert*).

The *tortuosum*-group

(Figs 13, 14)

Antennae with 11 segments. Sting appendage spatulate. Petiole strongly nodiform and often sculptured, at least on the sides; in dorsal view commonly longer than broad. Propodeum armed with spines or teeth. Mandibles smooth or striate. Dorsum of head generally with coarse or rugulose sculpture but without strong ground-sculpture. Antennal scapes with SI < 100 usually, only rarely slightly greater. Hairs on first gastral tergite not directed towards the midline of the sclerite. Dorsal (outer) surfaces of hind tibiae often densely equipped with elongate hairs which are curved towards the apex of the segment. Usually large, conspicuous species.

A large group containing 30 species at present, only two of which (*capillosum* and *tabarum*) are known from the Ethiopian region. The remaining species are distributed as follows: Oriental region 7, Indo-Australian region 5, Australasian region 5, Malagasy region 7, New World 4. On this sort of count one could therefore expect 8–10 species in the Ethiopian region, yet there are only two known. There are two possibilities to explain this paucity in sub-Saharan Africa. Firstly, the group may have developed elsewhere and not been able to colonize the Ethiopian region due to groups with similar habits but different origins having pre-empted the niches. I do not favour this alternative as a couple of species *are* present in Africa and also because the group as a whole has made good just about everywhere else in the world, presumably against stiff opposition in places.

Secondly, it is possible that the group was once as strongly represented in the Ethiopian region as elsewhere but has been pushed out by more recently developed and structurally more specialized species, particularly those of the *weitzeckeri*-group, and that *capillosum* and *tabarum* are the last remnants of the original *tortuosum*-group fauna.

Whichever of these is correct *capillosum* and *tabarum* should not be confused with any other species with 11-merous antennae in the Ethiopian region as the shape of the petiole and presence of long hairs on the hind tibiae render them immediately recognizable.

Within the *tortuosum*-group the closest relatives of *capillosum* appear to be *vertigum* Bolton and *palaense* Bolton, members of a complex of species centering on *tortuosum* itself and distributed mostly in South East Asia. This complex has been discussed by Bolton (1977). On the other hand *tabarum* is very much isolated, apparently not being closely related to any other known member of the group although its size and general appearance suggests affinities with the *belgaense*-complex of this group, discussed earlier (Bolton, 1977: 78).

Tetramorium capillosum sp. n.

(Fig. 13)

HOLOTYPE WORKER. TL 4·1, HL 0·92, HW 0·82, CI 89, SL 0·72, SI 88, PW 0·66, AL 1·16.

Mandibles coarsely longitudinally striate; anterior clypeal margin entire, evenly convex. Frontal carinae strong, running almost to occiput and surmounted by a raised rim or flange; divergent to level of eyes and thereafter roughly parallel. Antennal scrobes long and narrow, bounded above by the frontal carinae and below by a rugoreticulum, the portion above the eye being predominantly longitudinal. Maximum diameter of eye 0·20, about 0·24 × HW, the eye in profile long and narrow, nearly twice longer than broad. Alitrunk in profile continuous dorsally, not impressed at metanotum. Propodeal spines long, strong and acute; metapleural lobes elongate triangular, upcurved. Petiole in profile strongly nodiform, the node long and low; anterodorsal angle rounded and the posterior face somewhat convex. Postpetiole in profile with the node sloping upwards posteriorly, high and narrowly rounded at point where dorsum meets posterior face. Dorsum of head coarsely and irregularly longitudinally rugose with scattered anastomoses and cross-meshes and with a weak reticulum occipitally. Spaces between rugae with only very faint punctulate ground-sculpture. Dorsal alitrunk very densely and very coarsely rugose, predominantly longitudinal on the mesonotum but irregular or reticuliform elsewhere. Pedicel segments in dorsal view irregularly sulcate, with broad impressions separating rounded raised ridges; both segments virtually devoid of ground sculpture and very glossy. Sides of petiole and postpetiole with same sculpture as dorsum. Gaster smooth and shining. All dorsal surfaces of head and body abundantly clothed in long, fine, erect or suberect hairs, most of which are longer than the maximum diameter of the eye and the longest of them exceeding the length of the apical antennal segment. Dorsal (outer) surfaces of hind tibiae with abundant long fine hairs which are curved in the direction of the tibial apex. Colour black, the head with a reddish tint and the gaster dark brown; appendages dark brown.

PARATYPE WORKERS. As holotype but some concolorous black, some intermediate in shade between holotype and black individuals. Size range: TL 3·7–4·2, HL 0·88–0·94, HW 0·78–0·84, CI 87–91, SL 0·68–0·74, SI 85–89, PW 0·60–0·68, AL 1·08–1·22. Maximum eye diameter 0·18–0·20, about 0·23–0·24 × HW. (7 measured.)

Holotype worker, **Gabon**: Makokou, x.1972, rain forest (*I. Lieberburg*) (MCZ, Cambridge).

Paratypes. 7 workers with same data as holotype (MCZ, Cambridge; BMNH).

This is one of the two members of the *tortuosum*-group presently known from sub-Saharan Africa. Its affinities are discussed above under the species-group heading and its separation from *tabarum*, the other African member of the group, is discussed under that species-heading.

Tetramorium tabarum sp. n.

(Fig. 14)

HOLOTYPE WORKER. TL 2·8, HL 0·66, HW 0·59, CI 89, SL 0·50, SI 85, PW 0·46, AL 0·78.

Mandibles smooth and shining, with scattered small pits. Anterior clypeal margin entire, without trace of a median impression. Frontal carinae long, extending back almost to the occiput where they blend into the reticulate sculpture. Antennal scrobes shallow but quite broad and fairly conspicuous. Maximum diameter of eye 0·16, about 0·27 × HW. Pronotum bluntly marginate laterally, the pronotal corners rounded in dorsal view. Metanotal groove not impressed in profile but the posterior mesonotum very feebly stepped down to the propodeal dorsum. Propodeal spines short and thorn-like in profile, not much longer than the metapleural lobes. Petiole in profile very distinctly shaped, the high anterior face rounding into the convex dorsum through an even curve, the two not separated by an angle. Posterodorsal angle more distinct but also rounded, the posterior face below the angle feebly concave. Node of postpetiole in profile rising through an even curve from the petiolar junction but suddenly truncated posteriorly so that it has a short, vertical posterior face. Petiole in dorsal view roughly globular, about as broad as long, the postpetiole marginally broader than long but broader and more massive than the petiole. Dorsum of head with widely spaced longitudinal rugulae; between the frontal carinae at the level of the eyes are five major rugulae and two very short, much more feeble ones close to the carinae themselves. A weak reticulum with few anastomoses is developed occipitally which continues round the corners and onto the sides behind the eyes. Dorsal alitrunk with strong longitudinal rugulae, with some cross-meshes on the extreme anterior pronotum. Petiole, postpetiole and gaster unsculptured. All dorsal surfaces of head and body with numerous erect fine hairs, some of which are very long; the longest hairs on the alitrunk *c.* 0·24, the remainder at least as long as the maximum eye diameter, generally distinctly longer. Antennal scapes and tibiae of middle and hind legs with numerous erect fine hairs, the longest of which are shorter than the maximum width of the appendage from which they arise. Head, alitrunk, petiole and postpetiole bright orange-brown, the appendages somewhat lighter but the gaster much darker, blackish brown and contrasting strongly with the remainder of the body.

Holotype worker, **Zaire** ('Congo Belge' on data label): Epulu, 4.i.1949 (*J. C. Bradley*) (MCZ, Cambridge).

T. tabarum is one of the two representatives of the *tortuosum*-group known from the Ethiopian region. It is easily separated from *capillosum* by a number of characters, as tabulated below.

capillosum	*tabarum*
Mandibles coarsely striate.	Mandibles smooth.
Eyes smaller, 0·23–0·24 × HW.	Eyes larger, 0·27 × HW.
Petiole node long and low (Fig. 13).	Petiole node not long and low (Fig. 14).
Petiole and postpetiole sculptured.	Petiole and postpetiole smooth.
Head and alitrunk blackish.	Head and alitrunk bright orange-brown.

The *angulinode*-group

(Figs 15–18)

Antennae with 11 segments. Sting appendage spatulate. Mandibles smooth, unsculptured except for scattered pits. Anterior clypeal margin with a median impression, varying from feeble to distinct. Antennal scrobes broad, usually with a well-defined ventral margin and always with the anterior portion of the scrobe divided into upper and lower compartments by a longitudinal carina. Antennal scapes relatively short, SI 64–75. Metanotal groove not impressed when alitrunk viewed in profile. Propodeum usually with spines, absent in one species (*nullispinum*). Petiole strongly nodiform, in profile blocky, roughly cubic or rectangular and with sharply defined angles. Hairs on first gastral tergite very fine, often dense, quite short; those on the basal third of the tergite directed posteriorly but those on the more apical two-thirds partly or entirely directed towards the midline of the sclerite. Dorsal (outer) surface of hind tibiae with short, fine pubescence only.

A small compact group with eight closely related species in the Ethiopian region and a ninth established in the Oriental and Indo-Australian regions (*T. smithi* Mayr, see Bolton, 1977) which apparently is absent from Africa.

All the species in the Ethiopian region inhabit open grassland or savannah outside the forest zones, but are also found in clearings within forested areas, particularly in West Africa.

The form of the antennal scrobe in the *angulinode*-group is reminiscent of that seen in the *occidentale*-complex of *weitzeckeri*-group, but in these the petiole is squamiform and there is a marked tendency to lose sculpture on the head and alitrunk.

Tetramorium angulinode Santschi

(Fig. 17)

Tetramorium (*Xiphomyrmex*) *angulinode* Santschi, 1910*a*: 385, fig. 12. Syntype workers, female, male, CONGO: Brazzaville (*Weiss*) (NM, Basle; MRAC, Tervuren; MCZ, Cambridge) [examined].

Xiphomyrmex angulinode var. *daphnis* Santschi, 1920: 16, fig. 36. Syntype workers, female, RHODESIA: Bulawayo, hillside, 8.xii.1918 (*G. Arnold*) (BMNH; NM, Basle; MCZ, Cambridge) [examined]. **Syn. n.**

Xiphomyrmex papyri Weber, 1943: 374, pl. 16, fig. 36. Syntype females, SUDAN: 'Upper white Nile, in the Sudd. 8.vii.1939 no 1242 on board SS. *Gedid*' (*N. A. Weber*) (MCZ, Cambridge) [examined]. **Syn. n.**

Tetramorium humerosum Bernard, 1952: 246, figs 13, 13D. Syntype workers, CAMEROUN: 1895 (*Conradt*) (MHN, Geneva) [examined]. **Syn. n.**

WORKER. TL 2·3–2·9, HL 0·56–0·72, HW 0·50–0·72, CI 94–100, SL 0·34–0·50, SI 64–70, PW 0·42–0·56, AL 0·66–0·86 (15 measured).

Mandibles smooth and shining with scattered pits. Anterior clypeal margin with a small median impression. Antennal scrobes broad but shallow, their dorsal margins strongly defined by the frontal carinae, bounded weakly below by a longitudinal ruga running above the eye. A weak median longitudinal carina divides the anterior half of the scrobe into upper and lower sections, the carina running approximately to the level of the posterior margin of the eye. Pronotal corners square, distinctly angulate in dorsal view. Metanotal groove not impressed in profile but sometimes the alitrunk with a shallow step between the mesonotum and propodeum. Propodeal spines stout and acute, the metapleural lobes bluntly triangular. Petiole nodiform, in profile with the anterior and posterior faces vertical or nearly so, the dorsum feebly convex. Postpetiole in profile with the node about as long as that of the petiole, not anteroposteriorly compressed. In dorsal view the petiole node varying from slightly broader than long to slightly longer than broad; the postpetiole always much broader than long and considerably broader than the petiole. Head and alitrunk irregularly longitudinally rugulose, usually with very few cross-meshes except on the occiput where a narrow reticulum is present. Spaces between the rugulae shining, with weak ground-sculpture only. Dorsal surfaces of petiole and postpetiole with an open reticulum, the meshes of which are often broken or effaced in patches on one or both of the segments, leaving shiny unsculptured areas. Petiole with a fine narrow ridge running transversely across the junction of the anterior and dorsal faces and continuing obliquely down the side of the node towards the posteroventral corner. Side of petiole above this ridge more strongly sculptured than below it. First gastral tergite often with a band of widely scattered coarse punctures basally but this is reduced or absent in many specimens. All dorsal surfaces of head and body with numerous short, fine hairs, those on the gaster suberect to subdecumbent and, on the posterior two-thirds of the first tergite, directed towards the midline. Colour brown, varying from medium to dark.

A widespread but seemingly uncommon species usually inhabiting savannah or grassland, *angulinode* may also be found in forest clearings and in cultivated or otherwise disturbed ground within the forest zones. Nests of this species are usually made in the ground amongst the roots of grasses and low plants but it is also capable of nesting directly in the ground, especially at the bases of small trees.

Within the group the closest related species to *angulinode* are *chloe* and *zapyrum*, but in the first of these the postpetiole is strongly antero-posteriorly compressed and much narrower than the petiole in profile (compare Figs 18 and 17). In the second the dorsal surfaces of both pedicel segments are covered with a dense rugoreticulum, the spaces of which are packed with dense punctulate or granular sculpture so that both segments appear very rough and matt, not showing the open reticulum with shiny interspaces typical of *angulinode*.

The synonymy noted above is quite straightforward except for that of *humerosum*, which requires some explanation. In 1952 Bernard described *T. humerosum* from at least one specimen in the Forel Collection (MHN, Geneva) which had been labelled '*T. humerosum*' by Emery and given cotype labels, but which neither he nor Forel had ever actually got around to describing. These specimens were collected by Conradt in Cameroun and upon my enquiry Dr Cl. Besuchet kindly found and sent four such workers to me, all of which bore the relevant data.

It rapidly became clear that these specimens, which Bernard had nominated as types of *humerosum*, did not match his original description (Bernard, 1952: 246), which appeared to be based solely upon series of specimens mentioned by him from Nimba, Kéoulenta and N'zo in Guinea (his fig. 13D is of one of these specimens). The Guinea material, housed at MNHN, Paris, was examined and found to match his description but to be unrelated to the specimens from Cameroun nominated as types of the species. To untangle this problem the Cameroun material of Conradt's, unequivocally stated by Bernard as the type-series of *humerosum*, was found to be a straight synonym of *angulinode*, and the remaining series from Guinea are now free to be referred to their rightful place in the *flabellum*-group where they have been described under *T. ataxium*, as no prior name is available for them.

MATERIAL EXAMINED

Ghana: Bolgatanga (*P. M. Room*); Polcoase (*W. Belfield*). **Nigeria**: Mokwa (*C. Longhurst*); Gambari (*B. Bolton*); Ibadan (*B. R. Critchley*). **Zaire**: W. side of Ruwenzori (*N. A. Weber*); Medje (*H. O. Lang*); Kenge (*E. S. Ross & R. E. Leech*); Leopoldville (*A. Dubois*); Congo da Lemba (*R. Mayne*); Tondu (*H. Schouteden*); Moto (*L. Burgeon*). **Rhodesia**: Hillside (*G. Arnold*). **Botswana**: Maxwee (*A. Russell-Smith*).

Tetramorium calinum sp. n.

(Figs 15, 16)

HOLOTYPE WORKER. TL 3·5, HL 0·82, HW 0·80, CI 97, SL 0·54, SI 68, PW 0·62, AL 0·94.

Mandibles smooth and shining with scattered minute pits. Anterior clypeal margin with a slight median impression. Frontal carinae strongly developed, curving downwards posteriorly around the upper portion of the apex of the scrobe. Antennal scrobes broad and conspicuous, strongly defined dorsally by the frontal carinae but only weakly defined ventrally by a ruga running above the eye. Scrobe with a median longitudinal carina anteriorly which runs to the level of the posterior margin of the eye. Pronotal corners in dorsal view sharply angulate, the promesonotum virtually transversely flat, only feebly convex. Metanotal groove not impressed in profile. Propodeal spines long, stout and acute; metapleural lobes triangular. Node of petiole in profile massive, blocky and rectangular, slightly longer than high. In dorsal view the petiole node somewhat longer than broad but the postpetiole much broader than long. Scrobal area strongly reticulate-punctate. Dorsal surface of head and alitrunk irregularly longitudinally rugulose, the spaces between the rugulae completely filled by a dense, coarse and very conspicuous reticulate-puncturation. Dorsal surfaces of petiole and postpetiole more feebly and less regularly rugulose than the alitrunk but with the blanketing puncturation as strongly developed as on the alitrunk. Sides of pedicel segments conspicuously reticulate-punctate. Base of first gastral tergite unsculptured except for hair-pits. All dorsal surfaces of head and body with numerous fine, short, acute hairs. Colour dark brown, the gaster black.

PARATYPE WORKERS. As holotype, with range of dimensions TL 3·5–3·7, HL 0·80–0·82, HW 0·78–0·80, CI 97–100, SL 0·52–0·54, SI 65–69, PW 0·62–0·64, AL 0·88–0·92 (6 measured). In some individuals there is a tendency for the propodeal spines to be slightly downcurved along their length, but this varies from series to series.

Holotype worker, **Ghana**: Legon A/D., 30.iv.1970 (*D. Leston*) (BMNH).

Paratypes. Six workers with same data as holotype (BMNH; MCZ, Cambridge; NM, Basle).

Non-paratypic material examined. **Ghana**: Legon (*G. Benson*); Axim Area (*C. A. Collingwood*). **Nigeria**: Gambari (*B. Bolton*); Mokwa (*C. Longhurst*).

This medium-sized species appears to prefer open places and dry sandy soils as a nesting site. It is closest related to *legone*, which nests in similar situations, but in *legone* the base of the first gastral tergite is strongly sculptured. Apart from *legone* all other known species of the group lack the blanketing reticulate-punctate sculpture which is so conspicuous in *calinum*.

Tetramorium chloe (Santschi) comb. et stat. n.

(Fig. 18)

Xiphomyrmex angulinode var. *chloe* Santschi, 1920: 17, fig. 3c. Syntype workers, RHODESIA: Sawmills, 23.iii.1919 (*G. Arnold*) (NM, Basle; BMNH: MCZ, Cambridge) [examined].

WORKER. TL 2·2–2·6, HL 0·56–0·64, HW 0·54–0·62, CI 93–97, SL 0·34–0·42, SI 65–71, PW 0·42–0·48, AL 0·58–0·72 (6 measured).

Answering to the description given for *angulinode*, to which it is extremely closely related, but the two species differing as follows.

angulinode	*chloe*
With pedicel segments in profile the postpetiole node rounded, not reduced, not anteroposteriorly compressed, its length equal to or greater than the length of the petiole node (Fig. 17).	With pedicel segments in profile postpetiole node very reduced and anteroposteriorly compressed so that its length is distinctly less than the length of the petiole node (Fig. 18).
Sculpture always distinct at least in places on the postpetiole dorsum.	Postpetiole dorsum unsculptured and smooth.

In the type-series and the two other samples of *chloe* which have been examined these differences from *angulinode* have been consistent. However, in view of the small number of samples and knowing that node shape may be variable here as it is elsewhere in the genus the treatment of *chloe* as a separate species may have to be reviewed when further material is available in collections. To date all known samples of *chloe* have originated in Rhodesia.

MATERIAL EXAMINED

Rhodesia: Umtali (*G. Arnold*); Broken Hill (*G. Arnold*).

Tetramorium legone sp. n.

HOLOTYPE WORKER. TL 3·3, HL 0·76, HW 0·72, CI 95, SL 0·54, SI 75, PW 0·54, AL 0·86.

Mandibles smooth and shining with scattered small pits. Anterior clypeal margin with a median impression. Antennal scrobes broad and conspicuous, bounded above by the strong frontal carinae and ventrally by longitudinal rugular sculpture running above the eye. Scrobe with a median longitudinal carina anteriorly which runs back at least to the level of the posterior margin of the eye and divides the scrobe into upper and lower sections. Pronotal corners in dorsal view sharply angular. Propodeal spines stout and acute, slightly downcurved along their length; metapleural lobes broadly triangular. Petiole in profile with the node roughly square, as high as long, the anterior and posterior faces parallel and the dorsum feebly convex. Postpetiole only slightly lower than petiole, rounded above. In dorsal view the petiole node slightly longer than broad, the postpetiole distinctly broader than long. Dorsum of head and alitrunk finely longitudinally rugulose, the spaces between rugulae everywhere blanketed by a dense, strong reticulate-puncturation. Pedicel segments more weakly rugulose, reticulate in places and having the strong, dense puncturation everywhere. Basal one-quarter of first gastral tergite extremely densely, finely punctulate; in places with the appearance of minute striation due to the alignment of adjacent punctures. Remainder of gaster smooth and shining. Fine, simple, acute short hairs dense on all dorsal surfaces of head and body; on the first gastral tergite they are subdecumbent to decumbent and on the posterior two-thirds of the segment are directed towards the midline. Colour dark brown, the gaster darker, blackish brown.

PARATYPE WORKERS. As holotype but the sculpture on the first gastral tergite basally covering up to half of the sclerite. Size range TL 3·1–3·3, HL 0·76–0·80, HW 0·72–0·76, CI 95–97, SL 0·52–0·54, SI 68–75, PW 0·52–0·56, AL 0·84–0·90 (5 measured).

Holotype worker, **Ghana**: Legon A.D., 22.iii.72 (*D. Leston*) (BMNH).

Paratypes. **Ghana**: 5 workers with same data as holotype. **Nigeria**: 1 worker, 18 km N. of Mokwa, 28.iv.77 (*C. Longhurst*). (BMNH; MHN, Geneva; MCZ, Cambridge.)

Amongst all African *Tetramorium* with 11-merous antennae *logone* is unique in having the base of the first gastral tergite densely sculptured. Like the closely related *calinum* this species inhabits open, sandy soils. The relationship of *legone* to *calinum* may be closer than is indicated by the material presently available. As can be seen in the type-series of *legone* the area of the first tergite covered by sculpture is variable, and if some specimens were found in which this sculpture was very reduced they would be difficult to separate from *calinum*. It is quite possible that *legone* and *calinum* may represent two extremes of a single variable species, but only with the acquisition of further material will it be possible to test this hypothesis.

Tetramorium minusculum (Santschi) comb. n.

Xiphomyrmex minusculus Santschi, 1914*a*: 369, fig. 32. Holotype worker, CAMEROUN: Victoria (*F. Silvestri*) (NM, Basle) [examined].

Xiphomyrmex minusculus subsp. *amen* Weber, 1943: 376. Holotype worker, SUDAN: Imatong Mts, 4.viii.1939, no. 1430 (*N. A. Weber*) (MCZ, Cambridge) [examined]. **Syn. n.**

WORKER. TL 2·1–2·3, HL 0·52–0·54, HW 0·48–0·52, CI 92–96, SL 0·34–0·36, SI 68–71, PW 0·36–0·40, AL 0·52–0·60 (5 measured).

Mandibles smooth and shining with scattered minute pits. Anterior clypeal margin with a small median impression. Antennal scrobes strongly developed, broad, bounded above by the frontal carinae, below by a longitudinal ruga running above the eye and divided into upper and lower sections anteriorly by a longitudinal carina which runs back to the level of the posterior margin of the eye. Pronotal corners sharply angular in dorsal view. Propodeal spines short, stout and acute; the metapleural lobes triangular. Petiole nodiform, in profile slightly higher than long, in dorsal view about as long as broad or slightly longer than broad. Postpetiole transverse, distinctly broader than long. Sculpture very reduced, the head with a few feeble longitudinal rugulae on each side of the median carina, these rugulae short or broken and the spaces between them smooth or with only the faintest traces of superficial ground-sculpture. Dorsal alitrunk with only 4–5 widely spaced longitudinal rugulae, the spaces between them shining. Pedicel segments and gaster smooth and shining, unsculptured except for the sides of the petiole where faint traces of sculpture can usually be seen. Fine, simple acute hairs present on all dorsal surfaces of head and body, those on the first tergite directed towards the midline on the apical two-thirds of the sclerite. Colour uniform blackish brown to black.

When Santschi first described this small species he associated it with *muralti* on the ground that both had very reduced sculpture. However, the nodiform petiole and gastral pilosity indicate that the true affinities of *minusculum* lie with *angulinode* and its allies. Amongst these species *minusculum* is recognizable by its small size and reduced sculpture.

MATERIAL EXAMINED

Ivory Coast: Palmeraie de Lame (*T. Diomande*). **Ghana**: Legon (*G. Benson*).

Tetramorium nullispinum sp. n.

HOLOTYPE WORKER. TL 2·4, HL 0·60, HW 0·58, CI 97, SL 0·38, SI 65, PW 0·44, AL 0·64.

Mandibles smooth and shining with scattered minute pits. Anterior clypeal margin with a small median impression. Frontal carinae long and strong, slightly downcurved posteriorly and forming the margin of the upper portion of the scrobal apex. Antennal scrobes strongly developed, bounded above by the frontal carinae and below by a narrow cariniform ruga. Scrobe with a strong median longitudinal carina running back to the level of the posterior margin of the eye and dividing the scrobe into upper and lower compartments. Pronotal corners angular in dorsal view. Propodeum unarmed, the dorsum rounding into the declivity in profile. Metapleural lobes low and rounded. Petiole in profile nodiform, slightly higher than long, in dorsal view very slightly broader than long. Postpetiole distinctly broader than long in dorsal view. Head finely and densely longitudinally rugulose, with superficial punctulation between the rugulae and with a fine reticulum occipitally. Dorsal alitrunk irregularly longitudinally rugulose but the rugulae fewer in number and stronger than those on the head. Petiole with an unsculptured mediodorsal longitudinal strip, the postpetiole with superficial faint sculpture but more or less smooth mediodorsally. Apart from these smooth areas the pedicel segments lightly rugulose and with faint punctulation. Gaster unsculptured. All dorsal surfaces of head and body with numerous short, fine, acute hairs; those on the first gastral tergite directed towards the midline on the posterior two-thirds of the sclerite. Colour mid-brown, the gaster blackish brown.

Holotype worker, **Nigeria**: Ibadan I.I.T.A., 11–18.xi.1974, no. 34Aab (*B. R. Critchley*) (BMNH).

Of all the species with 11-merous antennae in the Ethiopian region *nullispinum* is the only one known which lacks propodeal armament.

Tetramorium sudanense (Weber) comb. n.

Xiphomyrmex sudanensis Weber, 1943: 373, pl. 16, fig. 40. Holotype worker, SUDAN: nr Torit, N. of Imatong Mts, 22.vii.1939, no. 1291 (*N. A. Weber*) (lost).

The holotype and only known specimen of this species is not present in AMNH, New York; LACM, Los Angeles; USNM, Washington or MCZ, Cambridge (where the main part of the Weber Collection is housed). The original description gives a picture of a species in the *angulinode*-group with measurements close to the bottom end of the range of *angulinode* itself (TL 2·3, AL 0·64) and generally bearing a close resemblance to the species. The following differences culled from Weber's description may be of importance.

1. Head slightly longer than broad.
2. Eyes closer to occipital than to clypeal margin.
3. Petiole with a massive squarish node, longer than broad in dorsal view.
4. Pedicel segments reticulate-punctate; postpetiole with a smooth median area.

There is not enough information given to pin down this species with any degree of accuracy and for this reason it has been omitted from the key. The only course which can be taken at present is to treat the name as a *nomen dubium* until the holotype is found (if that is possible) or until extensive collections can be made at the type-locality which may give some clue to the real identity of this species.

Tetramorium zapyrum sp. n.

HOLOTYPE WORKER. TL 2·9, HL 0·68, HW 0·66, CI 97, SL 0·46, SI 68, PW 0·50, AL 0·76.

Mandibles smooth with scattered small pits. Anterior clypeal margin with a small median impression. Antennal scrobes broad and conspicuous, strongly delimited above by the acute frontal carinae and below by a longitudinal carinate ruga running immediately above the eye. Scrobe with a median longitudinal carina anteriorly dividing it into upper and lower compartments, this carina running back to the level of the posterior margin of the eye. Pronotal corners strongly angulate in dorsal view. Propodeal spines elongate, strong, acute; metapleural lobes triangular. Petiole blocky in profile, the node as long as or somewhat longer than high, in dorsal view about as long as it is broad posteriorly. Postpetiole in dorsal view much broader than long. Head finely and quite densely longitudinally rugulose, developing a weak reticulum occipitally; spaces between the rugulae with superficial but fairly conspicuous punctulation. Dorsal alitrunk irregularly longitudinally rugose with very feeble punctulate interspaces which are glossy. Dorsal surfaces of petiole and postpetiole completely covered by a dense, coarse, disorganized rugoreticulum, the meshes of which are small and the spaces of which are filled with quite coarse and conspicuous punctures so that both segments appear very rough and matt. Petiole without a fine raised ridge running across the junction of the anterior and dorsal surfaces, the sides of the petiole coarsely sculptured throughout. Gaster unsculptured and shining. All dorsal surfaces of head and body with numerous short, fine hairs, those on the apical two-thirds of the first gastral tergite directed towards the midline. Colour dark brown, the gaster blackish brown.

PARATYPE WORKERS. As holotype, with dimensions TL 2·7–3·2, HL 0·64–0·74, HW 0·62–0·72, CI 94–98, SL 0·40–0·48, SI 64–75, PW 0·50–0·58, AL 0·72–0·82 (20 measured).

Holotype worker, **Ghana**: Legon, 24.ix.1970, ant ecology sample L39 (*D. Leston*) (BMNH).

Paratypes. **Ghana**: 6 workers with same data as holotype; 3 workers, Legon A.D., 15.vii.1970 (*D. Leston*). **Ivory Coast**: 30 workers, Palmeraie de Lame, no. 13, 21.i.1976 (*T. Diomande*). (BMNH; MCZ, Cambridge; NM, Basle; MHN, Geneva.)

Non-paratypic material examined. **Liberia**: Gibi (*W. M. Mann*). **Ivory Coast**: Banco Forest, nr Abidjan (*W. L. Brown*). **Ghana**: Legon (*D. Leston*); Tafo (*H. E. Box*); Tafo (*C. A. Collingwood*); Tafo (*B. Bolton*); Mt Atewa (*B. Bolton*); Mt Atewa (*C. A. Collingwood*); Asamankese (*D. Leston*). **Nigeria:** Gambari (*B. Bolton*); Ibadan (*B. R. Critchley*); Ile-Ife (*J. T. Medler*); Ile-Ife (*B. Lasebikan*). **Gabon**: M'Voum (*Brunck*).

This species is the commonest member of its group in West Africa but has not been previously described due to confusion with *angulinode* and other species. It inhabits forested areas or areas which were once forested but are now cleared for agriculture. Nests are constructed in twigs or pieces of rotten wood on the ground.

T. zapyrum is closely related to *angulinode* and *calinum*, but in the first of these the petiole has an open reticulum with shining spaces, not the coarsely sculptured mass seen in *zapyrum*, and in *calinum* the dorsal alitrunk is blanketed by a very coarse reticulate-puncturation.

The *solidum*-group

(Figs 19–30)

Antennae with 12 segments. Sting appendage dentiform to elongate triangular. Head massively constructed, HW > 0·80, often exceeding 1·00, equipped with powerful mandibles which are usually strongly sculptured. Anterior clypeal margin at least with a median notch or impression, often with an extensive semicircular emargination which may be very deep. Ventral surface of head usually with very long, conspicuous ammochaete hairs which in most species form a psammophore (absent only in *dichroum*). Frontal carinae very short or absent, when present ending in front of the level of the anterior margins of the eyes; often terminating just behind the frontal lobes. Antennal scrobes absent. Ventral margin of eye more or less flat, the anterior, dorsal and posterior margins curved so that the eye in profile resembles a reclinate letter D. Metapleural lobes short, low and rounded. Petiole node in dorsal view always broader than long. Pilosity on dorsal alitrunk, pedicel segments and first gastral tergite either absent (*solidum*-complex) or bizarre (*setuliferum*-complex), dense only in *peringueyi*-complex. Dorsal (outer) surfaces of hind tibiae with appressed pubescence in all but *peringueyi* and *dichroum* where short erect hairs are present. Base of first gastral tergite sculptured, even if only faintly shagreened; never completely smooth and shining.

A group of 13 very distinctive large species restricted to dry or semi-desert conditions in southern Africa. All species nest directly into the ground and the few which are common are known to be granivorous (Arnold, 1917), a condition which may well apply throughout the group.

The group falls neatly into three complexes of closely related species based on the form of the pilosity which they show. The first complex includes only *peringueyi* and *dichroum*, characterized by an abundant coat of short, stout erect hairs on all dorsal surfaces of the head and body, and also on the legs. Distribution of these hairs separates the two as in *peringueyi* erect short hairs are present on the antennal scapes but absent from them in *dichroum*. *T. dichroum* is unique in the group as, although elongate hairs are present on the ventral surface of the head, there are no specialized ammochaete hairs. In the second complex, which includes *clunum*, *galoasanum* and *setuliferum*, erect hairs are absent from the dorsal surfaces of the alitrunk, pedicel segments and first gastral tergite, but instead bizarre appressed pilosity is present. This consists of short, flattened, blunt hairs which are closely appressed to the surface of the sclerite on which they arise and which are usually silvery in colour and glittering in direct light.

The final and largest complex consists of *barbigerum*, *glabratum*, *grandinode*, *jordani*, *pogonion*, *rufescens*, *signatum* and *solidum*, in which the body is hairless or nearly so. Only *solidum* retains a few hairs on the dorsal alitrunk but none of the species have any hairs on the dorsal pedicel segments or the first gastral tergite. This complex also shows the strongest development of the psammophore and has the sculpture of the head and body finer than in other complexes of the group. Of the species included some have very definite diagnostic characters, such as absence of propodeal spines (*jordani*), presence of one or two pairs of erect fine hairs on the alitrunk (*solidum*), uniquely shaped pedicel segments (*grandinode*) or red colour (*glabratum*, *rufescens*) as opposed to the uniform black or blackish brown found in most species of the complex. Separation of the remainder rests on characters such as head shape, size of eyes, form of sculpture and overall size.

Tetramorium barbigerum **sp. n.**

(Figs 19, 20, 25)

HOLOTYPE WORKER. TL 5·1, HL 1·29, HW 1·24, CI 96, SL 0·92, SI 74, PW 0·78, AL 1·32.

Mandibles longitudinally rugose. Anterior clypeal margin with a shallow median concavity or impression. Frontal carinae absent, the frontal lobes extended back to the level of the anterior cephalic hairs by an extremely faint raised line, ending in front of the level of the anterior margins of the eyes. Antennal scrobes absent. Maximum diameter of eye *c.* 0·32, about 0·24 × HW. With the head in full-face view the occipital margin shallowly concave, the corners convex and broadly rounded. Head narrowing in front of eyes, the width directly behind them (HW) 1·24, immediately in front of them 1·17. Propodeal spines in profile short, thorn-like, slightly longer than their basal width,. Metapleural lobes narrow, evenly rounded, low. Petiole in profile strongly nodiform, in dorsal view broader than long, broadest posteriorly and with the anterior face convex, rounding into the lateral margins. Postpetiole broader than long in dorsal view, the sides rounded, broader than the petiole (maximum width of petiole node dorsally 0·37, of postpetiole 0·47). Dorsum of head with fine, scattered longitudinal costulae or faint rugulae, the spaces between them weakly punctulate or shagreened. The costulate part of the sculpture strongest behind the posterior clypeal margin, fading out posteriorly so that on the occiput only the slightest vestiges of longitudinal sculpture remain, the punctulate component conspicuous. Sides of head above and behind eyes and sides of occipital lobes predominantly punctulate-shagreened. Dorsal alitrunk uniformly very finely reticulate-punctulate, the punctures very tightly packed and appearing shagreened in places. Vestigial traces of costulae may be seen in places, especially on the pronotum. Dorsal surfaces of petiole and postpetiole very feebly shagreened, shining in patches. Base of first gastral tergite with vestigial shagreening which is almost effaced. Erect hairs absent from dorsal alitrunk, petiole, postpetiole and first gastral tergite, present on clypeus, gastral segments behind the first and on the first sternite. Dorsum of head behind clypeus with two pairs of hairs, the first situated between the levels of the posterior margins of the antennal fossae and the anterior margins of the eyes, the second located close to the occipital corners. Ventral surface of head with a strongly developed psammophore. Hind tibiae with appressed long pubescence. Colour uniform blackish brown, the appendages somewhat lighter.

PARATYPE WORKERS. TL 4·8–5·4, HL 1·30–1·34, HW 1·24–1·30. CI 94–97, SL 0·91–0·95, SI 72–76, PW 0·74–0·86, AL 1·20–1·40 (20 measured). Maximum diameter of eye 0·30–0·33, about 0·24–0·26 × HW. Conforming to description of holotype but in a few specimens the impression of the anterior clypeal margin slightly more strongly or more weakly developed. The erect hairs on the cephalic dorsum are easily lost by abrasion and one or two are missing in some of the paratypes. Colour not particularly variable but a few paratypes black.

Holotype worker, **South West Africa**: 10 miles [16 km] W. of Okombahe, 920 m, 10.v.1958 (*R. E. Ross & R. E. Leech*) (CAS, San Francisco).

Paratypes. Thirty-seven workers with same data as holotype (CAS, San Francisco; BMNH; MCZ, Cambridge; NM, Basle).

Within the *solidum*-complex of this group *barbigerum* is closest related to *jordani*, *signatum* and *pogonion*. It is easily separated from others in the complex as in *grandinode* the unique development of the petiole and postpetiole in that species renders it unmistakable, and it is unlikely to be confused with *rufescens* and *glabratum* as they are red in colour. *T. solidum* itself is isolated within the complex by possessing hairs on the dorsal alitrunk, which are absent in all other species.

Of the three that remain all have much coarser and denser cephalic sculpture than *barbigerum*, with very conspicuous longitudinal costulae or sharp rugulae. Besides this *jordani* lacks propodeal spines, their place being taken by a pair of minute tubercles or merely by an angle; *pogonion* is smaller (HW 0·86–0·92) with relatively larger eyes (0·29–0·31 × HW), and in both *pogonion* and *signatum* the head does not narrow in front of the eyes, compare Figs 20 and 21.

Tetramorium clunum Forel **stat. n.**

(Fig. 28)

Tetramorium setuliferum st. *cluna* Forel, 1913*c*: 218. Syntype workers, SOUTH AFRICA: Cape Prov., Willowmore, xii.1912 (*H. Brauns*) (BMNH; MHN, Geneva) [examined].

WORKER. TL 3·9–4·6, HL 1·00–1·18, HW 0·96–1·14, CI 94–98, SL 0·68–0·80, SI 65–72, PW 0·60–0·70, AL 0·95–1·16 (15 measured).

Mandibles coarsely longitudinally rugulose. Anterior clypeal margin with a quite shallow but extensive emargination so that the border is concave. Frontal carinae rapidly fading out behind the well-developed frontal lobes, not or only just reaching the level of the extreme anterior margins of the eyes. Antennal scrobes absent. Eyes of moderate size, maximum diameter 0·22–0·26, about 0·22–0·24 × HW. Outline of dorsal alitrunk unbroken in profile, the metanotal groove not impressed. Propodeal spines acute, strongly developed. Metapleural lobes broadly rounded and plate-like. Petiole in profile strongly nodiform, in dorsal view broader than long and distinctly broader behind than in front. In a few specimens the anterolateral corners of the node in dorsal view are slightly exaggerated and the anterior face has a tendency to form a slight concavity medially. Sternal portion of postpetiole in profile directed downwards into a distinctive blunt process, one on each side of the segment. If viewed from below the space between these two processes is flat or feebly concave and the processes are strongly prominent. In dorsal view the postpetiole roughly transversely oval, broader than the petiole. With the gaster in profile the basal portion of the first sternite not overhung and hidden by a thick downcurved projection of the tergum, the tergo-sternal suture being visible to the base of the gaster. Entire dorsum of head very finely and very densely longitudinally costulate, the small spaces between the costulae punctulate. Dorsal alitrunk basically similarly sculptured but the costulae much less strongly developed than on the head, nearly effaced in some so that only the punctulate sculpture remains. Dorsal surfaces of petiole and postpetiole densely punctulate and dull. First gastral tergite minutely longitudinally striolate from base to apex; in some the striolation not well developed and the gaster appearing shagreened and dull. Dorsal surfaces of head and body with sparse short, flattened, strongly appressed glittering silvery hairs. These are most easily observed on the occipital region of the head, the pronotum, pedicel segments and base of the first tergite; they are very strongly appressed and most appear to be sunk in small indentations in the cuticle. Similar but not so strongly appressed glittering hairs are present on the legs and antennal scapes. Elongate hairs are present only on the clypeus, dorsum of the head (1–2 pairs only), the gastral segments behind the first and the first sternite. Psammophore present on ventral surface of head. Colour dull reddish brown or brown.

Of the *solidum*-group three species possess appressed glittering hairs as described above, *clunum*, *setuliferum* and *galoasanum*. Of the three *galoasanum* is a large red species with CI > 100, which has the silvery hairs very densely and conspicuously distributed everywhere. In the two remaining species the specialized hairs are more sparsely represented but much denser in *setuliferum* than in *clunum*.

The main features separating *clunum* from *setuliferum* are as follows.

clunum	*setuliferum*
Base of first gastral tergite not overhanging tergosternal suture in profile; sternite visible to its base (Fig. 28).	Base of first gastral tergite overhanging tergosternal suture in profile, partially obscuring base of sternite (Fig. 27).
First gastral tergite sculptured throughout.	First gastral tergite sculptured basally.
Glittering silvery hairs sparse.	Glittering silvery hairs very dense.
Tergum of postpetiole without lateral alar prominences.	Tergum of postpetiole with lateral alar prominences.
Dorsum of head behind clypeus with at least one pair of erect elongate hairs.	Dorsum of head behind clypeus devoid of elongate erect hairs.

MATERIAL EXAMINED

South Africa: Cape Prov., Willowmore (*H. Brauns*); Cape Prov., Oudtshorn (*B. Brunhuber*); Cape Prov., Willowmore (*C. F. Jacot-Guillarmod*).

Tetramorium dichroum Santschi **stat. n.**

(Figs 22, 26)

Tetramorium solidum st. *dichroum* Santschi, 1932: 388. Syntype workers, SOUTH AFRICA: Kimberley (*Power*) (NM, Basle) [examined].

WORKER. TL 3·7–3·9, HL 1·00–1·04, HW 0·97–1·00, CI 96–97, SL 0·65–0·67, SI 66–68, PW 0·64–0·66, AL 1·00–1·04 (2 measured).

Mandibles longitudinally rugose. Anterior clypeal margin with a broad, deep median impression or excavation which involves about half the length of the margin. Frontal carinae ending before level of midlength of eyes. Eyes relatively large, maximum diameter *c.* 0·22–0·24, the lower margin flattened in profile, the upper convex. Alitrunk in profile evenly convex dorsally, the propodeum armed with a pair of acute spines. Metapleural lobes blunt apically. Petiole in profile blocky, more massive than postpetiole (Fig. 26); in dorsal view the petiole node broadest behind and somewhat narrower than the postpetiole. Head finely longitudinally rugulose from posterior margin of clypeus to occiput, but the rugulae less strongly developed posteriorly. Spaces between rugulae with very faint superficial reticulation. Dorsal alitrunk lightly and sparsely longitudinally rugulose, the interspaces with superficial punctulation and reticulation. Petiole and postpetiole similarly sculptured but the rugulae stronger than on the alitrunk and showing traces of a reticulate pattern in places. First gastral tergite punctulate-shagreened basally, sometimes also with a few very feeble rugulae. All dorsal surfaces of head and body with abundant short, stout hairs. Dorsal (outer) surfaces of mid and hind tibiae with short, stout, erect to suberect hairs which are also present elsewhere on the legs; antennal scapes with dense pubescence but without such hairs. Ammochaete hairs absent from ventral surface of head. Colour brown, the alitrunk tending to be a dull orange-brown, the head and gaster darker.

The species closest related to *dichroum* is *peringueyi* but this is a larger, more heavily sculptured form which has long ammochaete hairs on the ventre of the head and also has erect short hairs on the scapes similar to those on the hind tibiae.

In the *solidum*-group as a whole only these two species have erect or suberect hairs on the tibiae and a dense coat of erect hairs on the head and body.

Tetramorium galoasanum Santschi **stat. n.**

Tetramorium setuliferum var. *galaosana* Santschi 1910*a*: 381. Syntype workers, queens, males, CONGO: Brazzaville, viii.07; M'Bounion; Mindouga; Comba-Ibre (*Weiss*) (NM, Basle; MRAC, Tervuren; MCZ, Cambridge; BMNH) [examined].

Worker. TL 5·1–6·0, HL 1·42–1·52, HW 1·44–1·58, CI 101–105, SL 0·96–1·04, SI 66–68, PW 0·90–1·02, AL 1·44–1·56 (6 measured).

Mandibles longitudinally rugose. Median portion of clypeus with an extensive but shallow broadly emarginate anterior margin. Frontal carina absent, the frontal lobes terminated at the level of the posterior end of the antennal fossa. Antennal scrobes absent. Maximum diameter of eye 0·28–0·30, only about 0·18–0·20 × HW, relatively the smallest eyes in the *solidum*-group. Head massive, always slightly broader than long, CI > 100. Dorsal alitrunk evenly convex in profile, the propodeal spines acute and very stout. Metapleural lobes low and rounded. Petiole in profile strongly nodiform, in dorsal view rhomboid, somewhat broader than long but distinctly broader behind than in front. Postpetiole in dorsal view much broader than long and much broader than the petiole. In profile or in anterior view the tergal portion of the postpetiole overhanging the narrower sternal part at each side, but without developed lateral alar expansions. Subpostpetiolar process distinct in profile, continuous across the ventral surface, not forming a strong prominence on each side. Laterobasal corners of first gastral tergite extended downwards so that in profile the base of the tergo-sternal suture is hidden by the projection of the tergite. Dorsum of head finely longitudinally rugulose, the rugulae quite widely spaced and strongly reticulate-punctate between. Dorsal surfaces of alitrunk, petiole and postpetiole with irregular small rugulae and punctate interspaces. Basal half of first gastral tergite finely punctulate and with minute striolation. Sculpture everywhere partially concealed by the pilosity. Dorsal surfaces of head, alitrunk, pedicel segments and first gastral tergite densely clothed with appressed glittering silvery hairs which are directed towards the midline except on the base of the first tergite; similar hairs are present on the scapes and tibiae. Dorsal surfaces of body without erect hairs except for the clypeus and gastral segments behind the first. Ammochaete hairs present on ventral surface of head. Colour uniform red.

Three species in the *solidum*-group have appressed glittering hairs as described above, *setuliferum, clunum* and *galoasanum*. Of these three *galoasanum* is the largest and consistently has the head broader than long. The silvery appressed hairs are much more dense in this species and in many places on the dorsum they actually overlap each other and obscure the underlying sculpture. The subpostpetiolar process in *galoasanum* is less strongly developed than in the other two species and the postpetiolar tergum is not expanded into lateral alar extensions as are seen in *setuliferum*.

Tetramorium glabratum Stitz **stat. n.**

(Fig. 29)

Tetramorium solidum st. *glabratum* Stitz, 1923: 162. Syntype worker, South West Arica: Karibib, 23–26.iv.1911 (*W. Michaelsen*) (MNHU, Berlin) [examined].

Tetramorium solidum race *glabratum* var. *aciculatum* Stitz, 1923: 162. Holotype worker, South West Africa: Lüderitzbucht, 5–13.vii.1911 (*W. Michaelsen*) [types not in MNHU, Berlin; presumed lost]. [Name unavailable.]

Tetramorium rutilum Prins, 1973: 14, figs 14–18, 30A, B. Syntype workers, female, South Africa: Cape Prov., Vanrhynsdorp, 19.iv.63 (*J. J. Cillie*) (SAM, Cape Town) [examined]. **Syn. n.**

Worker. TL 5·0–5·7, HL 1·26–1·40, HW 1·18–1·32, CI 93–95, SL 0·86–0·98, SI 73–75, PW 0·78–0·87, AL 1·38–1·45 (3 measured).

Mandibles longitudinally rugulose, anterior clypeal margin with a shallow median impression. Frontal carinae very short, ending before the level of the midlength of the eyes. Maximum diameter of eye *c*. 0·36, about 0·27 × HW. Occipital corners broadly rounded, the occipital margin broadly but shallowly concave. Sides of head behind eyes weakly convex but in front of eyes more or less straight. Propodeum in profile shaped as in Fig. 29, the propodeal spines short, broad across the base and acute apically. Sides of pronotum with a vertical ridge or carina anteriorly which separates the pronotum proper from the cervical portion of the sclerite, this ridge petering out on the dorsum. Petiole and postpetiole in profile as in Fig. 29, in dorsal view the petiole broader than long, with a strongly arched anterior face and a more or less straight posterior face. Head finely longitudinally rugulose dorsally, the rugulae strongest on the clypeus and sides in front of the eyes but rapidly fading out posteriorly so that at the level of the posterior margins of the eyes they are very weak indeed. On the occiput the rugulae are so weak as to be absent or virtually absent and a very fine reticulate-punctulation becomes apparent, especially on the occipital corners. Dorsal alitrunk usually with some weak longitudinal rugulae, the spaces with fine dense reticulate-punctulation. Pedicel dorsally similarly sculptured but the rugulae weaker still, virtually or completely effaced. First gastral tergite basally with very faint, very fine, inconspicuous surface reticulation only. Dorsal surfaces of alitrunk, petiole, postpetiole and first gastral tergite without hairs, the head with 4–5 pairs dorsally. Dorsal surfaces of hind tibiae with short, appressed pilosity. Colour dull red, glossy.

In the *solidum*-group the species *glabratum* and *rufescens* are recognizable through their red colour combined with a complete lack of pilosity on the dorsal alitrunk and first gastral tergite. The two are separable as in *glabratum* the propodeal spines are short and broad whilst in *rufescens* they are elongate and narrow. Also, in *rufescens* the cephalic rugular sculpture is of approximately the same strength everywhere, the rugulae being clearly visible on the occipital corners, whilst in *glabratum* they fade out posteriorly and are replaced on the occipital corners by a fine reticulate-punctulation.

Tetramorium grandinode Santschi

(Fig. 23)

Tetramorium grandinode Santschi, 1913*a*: 308. Syntype workers, SOUTH AFRICA: Cape of Good Hope (NM, Basle) [examined].

Tetramorium grandinode var. *hopensis* Forel, 1914: 223. Syntype workers, SOUTH AFRICA: Orange River, Hope Town (MHN, Geneva) [examined]. **Syn. n.**

WORKER. TL 5·0–5·3, HL 1·24–1·32, HW 1·18–1·25, CI 95–97, SL 0·88–0·92, SI 72–75, PW 0·82–0·90, AL 1·30–1·40 (5 measured).

Mandibles lightly longitudinally rugose, only faint in some specimens. Anterior clypeal margin with a median shallow semicircular impression. Frontal carinae very short, fading out close behind the frontal lobes, scarcely reaching the level of the anterior margins of the eyes. Antennal scrobes absent. Maximum diameter of eye 0·32–0·34, about 0·26–0·27 × HW. Pronotum in dorsal view transversely marginate anteriorly. Dorsal outline of alitrunk unbroken in profile, the metanotal groove not impressed. Propodeal spines elongate and strong, metapleural lobes low and rounded. Petiole in profile with the body of the node high-rectangular but the more lateral portions antero-posteriorly compressed and extended, and the posteroventral portion of the tergum extended and downcurved. A carina is present which curves upwards from the base of this projection to the petiolar spiracle. In dorsal view the petiole node is much broader than long (maximum width *c.* 0·60–0·64), and is broader behind than in front (Fig. 23). Postpetiole in dorsal view enormously expanded laterally by projecting thick alar extensions so that the maximum width (*c.* 0·76–0·84) is only slightly less than the PW, and is slightly greater than the basal width of the first gastral tergite. In anterior view the extensions of the postpetiole tergum are seen to project well beyond the sternal portion. Dorsum of head very finely and densely longitudinally costulate, the more lateral costulae diverging posteriorly and curving onto the occipital lobes where they curve round and down the sides of the head and straighten out below the eye. Ground-sculpture between the costulae vestigial, the surfaces glossy. Dorsal alitrunk predominantly longitudinally costulate or fine rugulose, but usually with a few transverse components on the anterior pronotum, behind which some costulae are commonly curved or whorled. Dorsal surfaces of petiole and postpetiole transversely costulate or rugulose. Base of first gastral tergite finely and densely superficially punctulate or shagreened. Hairs of any description absent on the dorsal surfaces of the head and body except on the clypeus and gastral segments behind the first. Dorsum of head typically with two pairs of erect hairs behind the level of the clypeus, one pair at about the level of the anterior margins of the eyes and the second on the occipital corners. Scapes and tibiae with appressed pubescence only. Colour very deep reddish brown to blackish brown.

This spectacular species shows relationship both to *solidum* and its immediate allies and also to the *setuliferum*-complex in the way in which the postpetiole is modified. The lack of appressed silvery hairs in *grandinode*, however, seems to indicate a closer relationship to *solidum* than to *setuliferum* as they are very conspicuous and diagnostic of the last-named species and its closest relatives.

Within the *solidum*-complex *grandinode* is easily differentiated from all other species by the remarkable lateral extension of the postpetiole. In all other known species of the complex the postpetiole in dorsal view is globular or subglobular, without lateral alar prominences and conspicuously much narrower than the pronotum. Also, the lateral portions of the petiole node are not extended and antero-posteriorly compressed as they are in *grandinode*.

Tetramorium jordani Santschi

(Fig. 24)

Tetramorium jordani Santschi, 1937*c*: 62. Syntype workers, SOUTH WEST AFRICA: West of Maltahohe, 1500 m, 12.xii.1933 (*K. Jordan*) (BMNH) [examined].

Tetramorium aspinatum Prins, 1973: 12, figs 10–13, 29A, B. Syntype workers, female, SOUTH AFRICA: Cape Prov., Port Nolloth, 20.iv.63 (*J. J. Cillie*) (SAM, Cape Town) [examined]. **Syn. n.**

WORKER. TL 5·3–5·8, HL 1·32–1·34, HW 1·24–1·28, CI 94–96, SL 0·92–0·96, SI 73–76, PW 0·78–0·82, AL 1·28–1·34 (5 measured).

Mandibles longitudinally rugose. Anterior clypeal margin with a median impression. Frontal carinae very feeble and short, the frontal lobes rapidly narrowing posteriorly, extended back to the level of the anterior margin of the eye by a very weak ridge which is no more strongly developed than the remaining cephalic sculpture. Maximum diameter of eye 0·33–0·35, about 0·26–0·27 × HW. Propodeal spines absent, their place taken by a prominent angle or a pair of minute tubercles which are only a fraction of the width of the low, rounded metapleural lobes. Petiole in profile strongly nodiform, in dorsal view distinctly broader than long with a convex anterior face which rounds into the sides. Postpetiole in dorsal view broader than long and broader than the petiole. Dorsum of head finely and densely longitudinally costulate, the costulae becoming weaker occipitally but running to the margin at least medially. Small spaces between the costulae very finely punctulate, more conspicuously so occipitally where the costulae are weaker. Dorsal alitrunk finely and densely reticulate-punctulate with fairly frequent vestigial longitudinal costulae or weak rugulae. Dorsal surfaces of petiole and postpetiole very finely and densely punctulate, appearing granular. Base of first gastral tergite finely shagreened. Erect hairs absent from dorsal surfaces of alitrunk, pedicel segments and first gastral tergite. Hairs present on the clypeus, dorsum of head (2 pairs in unabraded specimens), first sternite and gastral segments following the first. Ventral surface of head with a psammophore. Hind tibiae with appressed pubescence. Colour black or blackish brown.

T. jordani is unique amongst the presently known species of the *solidum*-group as it is the only one in which propodeal spines are absent. In all other species of the group they are conspicuous.

Tetramorium peringueyi Arnold

Tetramorium peringueyi Arnold, 1926: 260. Syntype workers, SOUTH AFRICA: Kimberley, 1916 (*Power*) (NM, Bulawayo; BMNH; MCZ, Cambridge) [examined].

WORKER. TL 4·4–5·7, HL 1·16–1·36, HW 1·14–1·36, CI 97–100, SL 0·82–0·96, SI 70–73, PW 0·70–0·84, AL 1·26–1·46 (15 measured).

Mandibles coarsely longitudinally rugose. Anterior clypeal margin with an extensive, broad median emargination so that the border is concave. Frontal carinae very reduced, rapidly fading out behind the frontal lobes. Antennal scrobes absent. Maximum diameter of eye 0·24–0·27, about 0·20–0·22 × HW. Alitrunk in profile with even outline, without an impression at the metanotal groove. Propodeal spines stout and elongate, broad basally and rapidly tapering to an acute apex. Metapleural lobes blunt, irregularly rounded, the free margin uneven. Petiole in profile strongly nodiform; in dorsal view broader than long and broader behind than in front. Postpetiole in dorsal view broadly oval, much broader than the petiole and without lateral alar extensions. Dorsum of head with strongly developed, widely spaced longitudinal rugae which have widely spaced and feeble cross-meshes occipitally forming a weak, broad reticulum. Spaces between rugae finely and densely punctulate. Dorsal alitrunk predominantly longitudinally rugose, with a reticulum or irregular rugosity on the pronotum and sometimes elsewhere on the alitrunk also. Pedicel segments rugose dorsally. First gastral tergite longitudinally finely striate or costulate basally and usually also with faint punctulation, although this may be feeble in some individuals. All dorsal surfaces of head and body with abundant short, stout erect hairs. Tibiae of middle and hind legs with numerous short, stout, erect hairs, such hairs also present on the antennal scapes. Ventral surface of head with strongly developed psammophore. Colour orange-red to deep red.

Only two species of the *solidum*-group have numerous erect short hairs on the dorsal alitrunk and on the legs, *peringueyi* and *dichroum*. Elsewhere in the group only *solidum* has a few hairs present on the dorsal alitrunk but no other species has short erect hairs on the tibiae. *T. peringueyi* is separated from *dichroum* by the presence of a psammophore in the former and the presence of erect short hairs on the leading edges of the antennal scapes; both of these features are absent in *dichroum*. On top of this *dichroum* tends to be a smaller species than *peringueyi*, with relatively shorter scapes; in *dichroum* the known range of HW is 0·97–1·00, of SI 66–68; compare with *peringueyi* measurements given above.

MATERIAL EXAMINED

Botswana: Kalahari, Gomodimo (*Vernay-Lang*).

Tetramorium pogonion sp. n.

(Fig. 21)

HOLOTYPE WORKER. TL 3·8, HL 1·02, HW 0·86, CI 84, SL 0·76, SI 88, PW 0·58, AL 0·96.

Mandibles longitudinally rugose. Anterior clypeal margin with a median impression. Frontal carinae short and feeble, the frontal lobes extended back by a weak ridge, which is no stronger than the remaining cephalic sculpture, to a point just behind the level of the anterior margins of the eyes. Antennal scrobes absent. Eyes quite large, maximum diameter 0·26, about 0·30 × HW. With the head in full-face view the occipital margin very shallowly concave, the occipital corners rounded and the sides of the head diverging slightly to the posterior margins of the eyes. Width of head continuing to increase in front of eyes so that the head is broader in front of the eyes than behind them. Propodeal spines elongate and narrow, acute apically. Metapleural lobes low and broadly rounded. Petiole in profile strongly nodiform; in dorsal view slightly broader than long and shaped like a triangle with bluntly rounded angles, much broader behind than in front. Postpetiole in dorsal view subglobular, broader than long and broader than the petiole. Dorsum of head with separated longitudinal costulae or fine rugulae, the spaces between them with superficial ground-sculpture which is somewhat more conspicuous occipitally. Dorsal alitrunk finely reticulate-punctulate with scattered fine longitudinal rugulae on the promesonotum. Petiole and postpetiole very finely and superficially reticulate-punctulate dorsally, appearing granular. Base of first gastral tergite shagreened. Erect hairs absent from dorsal surfaces of alitrunk, petiole, postpetiole and first gastral tergite; present on clypeus, gastral segments behind the first, first gastral sternite and dorsum of head where two pairs occur. Ventral surface of head with a strongly developed psammophore. Hind tibiae with appressed pubescence. Colour uniform blackish brown.

PARATYPE WORKERS. As holotype, with range of dimensions TL 3·8–4·1, HL 1·00–1·06, HW 0·86–0·92, CI 84–89, SL 0·74–0·77, SI 82–88, PW 0·58–0·62, AL 0·96–1·04 (6 measured). Maximum diameter of eye 0·26–0·28, about 0·29–0·31 × HW.

Holotype worker, **South West Africa**: 37 miles [60 km] W. of Aus, 500 m, 5.v.1958 (*E. S. Ross & R. E. Leech*) (CAS, San Francisco).

Paratypes. Six workers, 2 males, 3 females with same data as holotype (CAS, San Francisco; BMNH; MCZ, Cambridge).

The smallest species yet found in the *solidum*-group, it is much smaller than all its closest relatives in the *solidum*-complex where HW is usually > 1·00, and the eyes of *pogonion* are relatively larger than in other *solidum*-complex members, being 0·29–0·31 × HW as opposed to a range of 0·24–0·27 × HW in all but *signatum*, where the eyes are similar in size to those of *pogonion*. *T. signatum* is, however, a much larger and more heavily built species with shorter antennal scapes (CI 89–95, SI 72–75 in *signatum*).

Tetramorium rufescens Stitz **stat. n.**

(Fig. 30)

Tetramorium solidum st. *rufescens* Stitz, 1923: 163. Syntype workers, SOUTH WEST AFRICA: Swakopmund, 12–19.iv.1911 (*W. Michaelsen*) (MHNU, Berlin) [examined].

WORKER. TL 4·0–5·1, HL 1·04–1·28, HW 0·92–1·18, CI 88–95, SL 0·78–0·88, SI 71–80, PW 0·62–0·80, AL 1·04–1·34 (12 measured).

Mandibles longitudinally rugose. Antennal clypeal margin with a small, narrow median notch or impression which may be difficult to see when the mandibles are fully closed. Frontal carinae extending back to a point about level with the anterior margins of the eyes by a weak ridge which is, however, usually more strongly developed than the remaining cephalic sculpture. Approximate points of termination of the frontal carinae marked by an erect hair on each side of the head. Antennal scrobes absent. Maximum diameter of eye 0·27–0·32, about 0·25–0·28 × HW. Propodeal spines long, narrow and acute, much longer than their basal width. Metapleural lobes low and rounded. Petiole in profile strongly nodiform, in dorsal view slightly broader than long and much broader behind than in front; anterior face of node quite narrowly rounded and the sides diverging strongly posteriorly. Postpetiole in dorsal view distinctly broader than long, with rounded sides, much broader than the petiole. Dorsum of head finely and quite densely longitudinally costulate or rugulose, the spaces between them with only faint, superficial ground-sculpture; glossy in large individuals. Dorsal alitrunk finely and densely reticulate-punctate, commonly with a few weak longitudinal costulae or rugulae on the promesonotum. Dorsal surfaces of petiole and postpetiole very weakly but densely reticulate-punctulate, in some this sculpture very feeble so that the surface appears merely roughened or lightly shagreened. Base of first gastral tergite lightly shagreened. Erect hairs absent from dorsal surfaces of alitrunk, pedicel segments and first gastral tergite; present on clypeus, first gastral sternite and segments behind the first. Dorsum of head with two pairs of hairs, one at the apices of the frontal carinae, the other on the occipital corners. Ventral surface of head with psammophore. Hind tibiae with appressed pubescence. Colour dull red, usually with the gaster darker in shade than the alitrunk and head.

In the *solidum*-complex of this group only two species are known which are red, *glabratum* and *rufescens*, the rest being black or blackish brown. These two may be separated easily as in *glabratum* the propodeal spines are short and broad and the rugulose or costulate cephalic sculpture fades out occipitally and is replaced on the occipital corners by a fine reticulate-punctulation. In *rufescens* on the other hand the propodeal spines are elongate and narrow and the costulate cephalic sculpture is present everywhere on the head, including the occipital corners.

Red species are known in other complexes of the *solidum*-group but these are differentiated by the characters defining the complex to which they belong. In the *setuliferum*-complex *setuliferum* itself and *galoasanum* are both red, but both have numerous appressed glittering hairs, whilst red species of the *peringueyi*-complex have abundant short erect hairs on the dorsal alitrunk.

MATERIAL EXAMINED

South West Africa: Fish River Canyon (*St. Andrew's College Explor. Soc.*); Okahanja (*P. M. Hammond*); Spitzkopje (*E. S. Ross & A. R. Stephen*); Maltahoe Distr., Sesriem Farm (*D. Hollis*).

Tetramorium setuliferum Emery
(Fig. 27)

Tetramorium squamiferum Forel, 1894: 80 [attributed to Emery]. [Nomen nudum, see Wheeler, 1922: 903.]

Tetramorium setuliferum Emery, 1895: 36. Syntype workers, SOUTH AFRICA: Vrijburg (*E. Simon*) (MHN, Geneva; MRAC, Tervuren) [examined].

Tetramorium setuliferum var. *cucalense* Santschi, 1910*b*: 356. Syntype workers, ANGOLA: Benguela, Cucala près Cacunda (*J. Cruchet*) (NM, Basle; MRAC, Tervuren) [examined]. **Syn. n.**

Tetramorium setuliferum var. *triptolemus* Arnold, 1917: 292. Syntype workers, ZAMBIA ('N. Rhod.' on data label): Lusakas, x.1913 (*G. Arnold*) (BMNH) [examined]. **Syn. n.**

WORKER. TL 4·4–6·0, HL 1·12–1·50, HW 1·12–1·48, CI 97–100, SL 0·76–1·00, SI 67–73, PW 0·74–0·96, AL 1·16–1·48 (30 measured).

Mandibles coarsely longitudinally rugose. Median portion of clypeus with the anterior margin concave, extensively but shallowly excavated. Frontal carinae absent, the frontal lobes rapidly fading out posteriorly, ending in front of the level of the anterior margins of the eyes. Antennal scrobes absent. Eyes moderate, maximum diameter 0·24–0·31, about 0·20–0·24 × HW. Outline of dorsal alitrunk unbroken in profile, the metanotal groove not impressed. Propodeal spines broad basally, rapidly tapering to acute apices. Metapleural lobes rounded, their outline shape variable. Petiole in profile strongly nodiform, often with the anterodorsal corner sharp or projecting as a low tubercle, this last feature more common in larger than in smaller individuals. In dorsal view petiole node broader than long, slightly variable in shape but always rhomboidal, much broader behind than in front. Postpetiole in dorsal view distinctly much broader than long, much broader than petiole, very nearly as broad as the base of the first gastral tergite. The width of the postpetiole is achieved by the presence of quite wide lateral alar extensions so that in front view or profile the tergum of the node is much wider than the sternum and strongly overhangs it. Laterobasal angle of first gastral tergite extended and downcurved so that in profile it forms a flap overhanging the base of the sternite and rendering the tergo-sternal suture invisible basally. Dorsum of head very finely and very densely longitudinally costulate or striolate, the narrow interspaces punctate. In small specimens the longitudinal component of the sculpture may be faint or exceedingly fine so that the punctate component predominates. Dorsal alitrunk uniformly reticulate-punctate but commonly also with some fine longitudinal costulae or narrow rugulae. Dorsal surfaces of petiole and postpetiole evenly reticulate-punctate, only very rarely with traces of costulae or faint rugulae. Basal one-third to one-half of first gastral tergite very finely and densely longitudinally striolate or costulate, the narrow spaces punctulate. Again in small individuals the punctulate component may predominate. All dorsal surfaces of head and body with scattered but quite numerous appressed glittering silvery hairs, many of which appear to be sunk into small impressions in the cuticle. On the dorsum erect long hairs are present only on the clypeus and the gastral segments behind the first. Ammochaete hairs present on ventral surface of head. Colour uniform dull red, varying in shade from series to series.

The three members of the *setuliferum*-complex within the *solidum*-group are characterized by the possession of appressed glittering silvery hairs on the dorsal surfaces of the head and body. Of these three species *setuliferum* is both the most common and most widely distributed, ranging from Malawi and Angola to South Africa. Differences separating *setuliferum* from its closest relatives are tabulated under *clunum* and *galoasanum*.

Arnold (1917) noted the granivorous nature of *setuliferum* and observed that the nest entrances, which are in the ground, are often surrounded by an untidy array of discarded seed husks.

MATERIAL EXAMINED

Malawi: Njakwa (*E. S. Ross & R. E. Leech*). **Tanzania**: Dodo M. (*W. M. Mann*). **Zambia**: Lusakas (*G. Arnold*). **Mozambique**: Beira (*G. Arnold*). **Rhodesia**: Lonely Mines (*H. Swale*); Victoria Falls (*G. Arnold*); Victoria Falls (*M. Grabham*); Mwengwa (*H. Dollman*); Bulawayo (*G. Arnold*); Bulawayo (*Penther*); W. Bulawayo, Khami Ruins (*E. S. Ross & R. E. Leech*); Mt Silinda (*Saudground?*); Mashonaland (*B. Knight*); Spes Bona Farm (*G. H. Bunzli*); Matopo Hills (*W. L. Brown*); Wankie Nat. Pk (*W. L. Brown*). **Botswana**: Sevrelela (*Schultze*); Nkate (*Verney-Lang*); Kuke Pan (*H. Lang*). **South West Africa**: Gobabeb (*E. S. Ross & A. R. Stephen*). **South Africa**: Transvaal, Barberton (*F. S. Parsons*); Transvaal, Gravelotte (*E. S. Ross & R. E. Leech*); Natal (*Haviland*); Natal (*G. B. King*); Natal, E. of Mkuze (*W. L. & D. E. Brown*); Pretoria (*J. C. Bradley*). **Lesotho**: Mamthes (*J. C. Bradley*).

Tetramorium signatum Emery **stat. n.**

Tetramorium solidum var. *signatum* Emery, 1895: 35. Syntype worker, SOUTH AFRICA: Cape, Matjesfontein (*E. Simon*) (MHN, Geneva) [examined].

Tetramorium solidum subsp. *lugubre* Forel, 1910*b*: 425. Syntype workers, ANGOLA: Mossamedes (*de Picard*) (MHN, Geneva) [examined]. **Syn. n.**

Tetramorium solidum var. *grootensis* Forel, 1913*b*: 118. Holotype female, SOUTH AFRICA: Cape, Willowmore (*H. Brauns*) (BMNH) [examined]. **Syn. n.**

Tetramorium solidum var. *tuckeri* Arnold, 1926: 259. Syntype workers, female, SOUTH WEST AFRICA: Brehdon, 20.xii.1915 (*R. W. E. Tucker*) (BMNH) [examined]. **Syn. n.**

Worker. TL 4·4–5·3, HL 1·20–1·36, HW 1·08–1·28, CI 89–95, SL 0·80–0·94, SI 72–75, PW 0·70–0·82, AL 1·16–1·32 (8 measured).

Mandibles longitudinally rugulose. Anterior clypeal margin with an extensive median emargination, the central portion of the margin markedly concave. Frontal carinae very short, the frontal lobes tailing off into a low ridge which runs approximately to the level of the anterior margins of the eyes before fading out or merging with the remaining cephalic sculpture. Antennal scrobes absent. Eyes large, maximum diameter 0·30–0·40, about 0·27–0·30 × HW. Propodeal spines in profile short, broad basally, usually longer than their basal width but their shape and size varying in individuals from the same nest. Metapleural lobes low and rounded. Petiole in profile strongly nodiform, in dorsal view broader than long and broader behind than in front. Postpetiole with a strongly developed ventral process on each side, the space between these two processes transversely concave so that they project freely below the node. Dorsum of head finely and quite densely costulate or longitudinally rugulose, the spaces between with only faint ground-sculpture. The longitudinal sculpture tends to diverge posteriorly onto the occipital lobes but does not fade out, costulate or rugulose sculpture being present to the occipital margin. Dorsal alitrunk longitudinally finely rugulose, the spaces weakly punctulate but this ground-scupture usually stronger than that on the head. Petiole and postpetiole predominantly densely punctulate or shagreened but very often with a few feeble disorganized rugulae present on the surface. First gastral tergite punctulate or shagreened basally, sometimes with traces of very faint costulae present. Dorsal surfaces of alitrunk, petiole, postpetiole and first gastral tergite without hairs. Elongate hairs present on gastral segments behind the first and on the first sternite. Head with hairs on clypeus and with 2–3 pairs on dorsum behind the level of the clypeus. Ventrally the head with a psammophore. Colour dark brown to blackish brown.

Most of the close relatives of *signatum* can be quickly separated from it as *solidum* has hairs on the dorsal alitrunk (absent in *signatum*), *jordani* lacks propodeal spines (present in *signatum*), *grandinode* has its uniquely constructed pedicel (Fig. 23) and *glabratum* and *rufescens* are red in colour where *signatum* is uniformly black or blackish brown. Of the two remaining related species *pogonion* is much smaller (HW < 0·95) and has relatively long scapes (SI > 80) whilst in *barbigerum* the head is different in shape, narrowing in front of the eyes (Fig. 20). Also, in the last two species mentioned the development of the clypeal impression is much less than in *signatum*, being small and inconspicuous as opposed to the extensive emargination present in *signatum*. Finally, the costulate or rugulose sculpture of the head becomes much weaker occipitally in *barbigerum* and is extensively effaced and replaced by punctulation, whereas in *signatum* the costulate or rugulose sculpture is strongly represented occipitally.

MATERIAL EXAMINED

South Africa: Cape Prov., Willowmore (*H. Brauns*); Willowmore (*G. Arnold*).

Tetramorium solidum Emery

Tetramorium solidum Emery, 1886: 362, pl. 17, fig. 7. Syntype workers, female, SOUTH AFRICA: Cape of Good Hope (*L. Peringuey*) (MHN, Geneva; MRAC, Tervuren) [examined].

WORKER. TL 4·1–5·1, HL 1·10–1·28, HW 1·06–1·26, CI 94–98, SL 0·74–0·88, SI 66–71, PW 0·68–0·74, AL 1·10–1·31 (10 measured).

Mandibles longitudinally rugose. Anterior clypeal margin with an extensive, deep and very conspicuous median emargination which is usually roughly semicircular. Frontal carinae very short, extending back from the frontal lobes as a fine ridge on each side which ends at about the level of the anterior margins of the eyes. Antennal scrobes absent. Eyes quite small, maximum diameter 0·26–0·28, about 0·21–0·23 × HW. (In all other members of the complex the diameter is 0·24 × HW or more.) Propodeal spines elongate and acute. Metapleural lobes low and rounded. Petiole in profile strongly nodiform, in dorsal view broader than long and distinctly broader behind than in front. Dorsum of head longitudinally costulate or rugulose, the sculpture strongest behind the clypeus, becoming weaker posteriorly and becoming very fine on the occiput where it diverges onto the lateral occipital lobes. Spaces between the longitudinal components with very finely punctulate or granular ground-sculpture. Dorsal alitrunk faintly longitudinally rugulose and with fairly distinctive fine punctulation. Pedicel segments predominantly finely punctulate dorsally, rarely with a couple of very faint rugulae. Base of first gastral tergite weakly shagreened. Hairs numerous on clypeus, gastral segments behind the first and on first gastral sternite. Elsewhere long hairs distributed as follows: dorsum of head behind clypeus with 3–4 pairs; dorsum of pronotum with 2 or rarely 3 pairs; alitrunk at junction of mesonotum and propodeum with one pair; pedicel segments dorsally usually without hairs but rarely with one pair on one or both segments. First gastral tergite hairless. Ventral surface of head with a psammophore. Colour dark brown or blackish brown.

Although *solidum* is closest related to *signatum* and its allies it is immediately separable from them by the presence of hairs on the dorsal alitrunk.

MATERIAL EXAMINED

South Africa: Cape Prov., Cape of Good Hope (*Staudinger*); Cape Prov., Berg Riv., Picketberg (*E. S. Ross & R. E. Leech*).

The *squaminode*-group

(Figs 31–39)

Antennae with 12 segments. Sting appendage spatulate, sometimes short and difficult to see. Petiole squamiform, much higher than long in profile and much broader than long in dorsal view. Postpetiole usually rounded-nodiform, only rarely subsquamate or anteroposteriorly compressed. Mandibular sculpture variable, in most species smooth or with only faint traces of sculpture, but in some coarsely striate. Anterior clypeal margin usually indented medially but this is reduced in some species and absent in the *repentinum*-complex. Frontal carinae strongly developed, reaching back almost to occipital margins. Antennal scrobes present, broad but quite shallow. Sculpture predominantly absent from pedicel segments so that the petiole and postpetiole are usually smooth. First gastral tergite unsculptured except in *umtaliense* where short basal costulae occur. Pilosity usually of fairly dense short stout hairs, most or all of which are blunt apically (fine and acute in *akermani*). Scapes and tibiae equipped with short fine pubescence which is decumbent or appressed, without standing pilosity of any description.

The 13 known species of this group fall into two very unevenly sized complexes of closely related forms. The first of these contains only *repentinum* and *sitefrum*, characterized by the position of their eyes, which are shifted well back on the sides of the head (Fig. 34), distinctly posterior to the midlength of the sides. Besides this the clypeal notch is lost and there is a tendency for the clypeus to project slightly anteromedially. The sinuous nature of the frontal carinae is suppressed so that they are almost straight and strongly diverge from front to back. The basal margin of the mandible is slightly inflected and the apical and second mandibular teeth are disproportionately large, the third tooth and subsequent denticle-row being very small.

Arnold (1926) reports that *repentinum* feeds on other ants, and it may be the case that the structural modifications shown by these two species are in response to this rather dangerous lifeway.

The second complex, centring on *squaminode* itself, contains the remaining eleven species of this group. In these the eyes are approximately at the midlength of the sides of the head, the clypeal notch or impression is generally present though reduced in some species, the frontal carinae are markedly sinuate throughout their length and the mandibles are not modified as above.

This complex can be divided roughly into more strongly sculptured forms, in which the mandibles are strongly longitudinally striate (*dogieli, platynode, nube, squaminode, umtaliense*), and less strongly sculptured forms in which the mandibles are smooth or have only vestiges of sculpture at most (*akermani, do, flaviceps, frigidum, jejunum, matopoense*).

Most species of the *squaminode*-group are restricted to southern Africa but *sitefrum* is found in Ghana, *nube* in Sudan and *squaminode* in Tanzania. The enigmatic *dogieli* is from Kenya but may be misplaced in this group (see under *dogieli*). All remaining species are confined to Rhodesia and South Africa but this is quite probably a reflection of the distribution of collectors rather than a fact of the distribution of the species.

Tetramorium akermani Arnold

Tetramorium akermani Arnold, 1926: 265, fig. 73. Syntype workers, SOUTH AFRICA: Pietermaritzburg, 13.viii.1917 (*C. Akerman*) (BMNH) [examined].

Tetramorium akermani var. *myersi* Arnold, 1958: 123. Syntype workers, SOUTH AFRICA: Cape Prov., Sundays Riv. Valley, x.1955 (*N. J. Myers*) (BMNH; NM, Bulawayo) [examined]. **Syn. n.**

WORKER. TL 3·7–4·0, HL 0·88–0·94, HW 0·82–0·88, CI 91–94, SL 0·64–0·68, SI 76–78, PW 0·60–0·66, AL 0·98–1·08 (16 measured).

Mandibles usually smooth and shining but rarely with very faint traces of striation in the apical third. Anterior clypeal margin with a median notch or impression. Frontal carinae long and sinuate, reaching back almost to the occipital margin where they merge with the remaining cephalic sculpture. Antennal scrobes shallow but distinctive. Maximum diameter of eyes 0·20–0·21, about 0·23–0·24 × HW. Metanotal groove usually not indicated in profile but in a few workers a very shallow and feeble impression is present. Propodeal spines elongate and strong, metapleural lobes low and triangular. Petiole squamiform, much higher than long in profile and bluntly rounded dorsally; in dorsal view much broader than long but slightly narrower than the postpetiole which is also distinctly broader than long. Postpetiole in profile lower than petiole and broadly rounded, the sternal portion not produced into a freely projecting lobe on each side. Dorsum of head irregularly but quite densely longitudinally rugulose, with a narrow reticulum occipitally. Dorsal alitrunk also irregularly and predominantly longitudinally rugulose, but commonly with reticular meshes on the anterior half of the pronotum, more rarely also with reticulation elsewhere. Petiole and postpetiole usually smooth, but quite commonly the postpetiole with vestiges of rugular sculpture. Gaster unsculptured. All dorsal surfaces of head and body densely clothed with elongate, fine, soft acute hairs.

Posterior tibiae with fine pubescence which is usually subdecumbent. Colour dark brown to blackish brown, usually with the gaster darker in shade.

T. akermani is the only known species of the *squaminode*-complex of this group to possess long, soft, acute hairs on the dorsal surfaces of the body. All other species in the complex have the main pilosity stout and have most or all of the hairs blunt or truncated apically.

MATERIAL EXAMINED

Rhodesia: Inyanga (*G. Arnold*). **South Africa**: Natal, Majuba (*C. Akerman*); Cape Prov., Grahamstown (*J. Hewitt*).

Tetramorium do Forel
(Fig. 32)

Tetramorium squaminode st. *do* Forel, 1914: 224. Syntype workers, female, males, RHODESIA: Bulawayo, 15.xi.1913 (*G. Arnold*) (BMNH; MHN, Geneva) [examined].
Tetramorium do Forel; Arnold, 1960*b*: 82. [Raised to species.]

WORKER. TL 3·0–3·2, HL 0·74–0·78, HW 0·68–0·74, CI 89–95, SL 0·50–0·54, SI 71–74, PW 0·52–0·57, AL 0·80–0·90 (8 measured).

Mandibles smooth and shining with scattered pits. Anterior clypeal margin with a shallow median impression. Anterior one-quarter of median portion of clypeus almost vertical, much more steep than the posterior three-quarters. Median clypeal carina bifurcated at the point where the clypeus turns down. Frontal carinae long and strongly sinuate, extended back almost to the occipital corners and surmounted by a very prominent raised rim or flange. Maximum diameter of eye 0·18–0·19, about 0·24–0·26 × HW. Antennal scrobes shallow but broad and conspicuous. Propodeal spines long and strong; metapleural lobes low and acutely triangular. Petiole squamiform, in profile much higher than long and in dorsal view much broader than long. Postpetiole subsquamate, its node in profile strongly antero-posteriorly compressed and narrow, but lower and more broadly rounded above than the petiole. In dorsal view the postpetiole much broader than long and markedly broader than the petiole. Head with spaced out irregular longitudinal rugulae, with a narrow rugoreticular band occipitally. Spaces between the rugulae glossy, with only vestigial ground-sculpture which may be effaced in patches. Dorsal alitrunk irregularly rugose, generally with the longitudinal component predominant but most specimens with numerous or abundant cross-meshes on the promesonotum. Petiole, postpetiole and gaster unsculptured, smooth and shining. All dorsal surfaces of head and body with numerous fairly stout, blunted hairs, the majority of which are short. Scapes and tibiae with short decumbent pubescence only. Colour mid-brown, the gaster usually blackish brown.

In the *squaminode*-complex of this group *do* stands out as the only species in which the postpetiole is antero-posteriorly compressed and subsquamate. In other species of the complex the postpetiole is low and broadly rounded.

MATERIAL EXAMINED

Rhodesia: Bulawayo (*G. Arnold*); Mimosa Park (*G. Arnold*); Fletcher's Creek (*G. Arnold*).

Tetramorium dogieli Karavaiev

Tetramorium dogieli Karavaiev, 1931: 48, fig. 6. Holotype worker, KENYA: Naivasha, no. 5296 (*Dogiel & Sokolov*) (location of type not known).

The location of the holotype and only known specimen of this species is not known. I include it in this species-group with some misgivings as, although the generic name is stated as *Tetramorium*, no antennomere count is given. I am thus led to assume that the antennae are 12-segmented but this may not be the case as miscounts of antennal segments were fairly frequent in the past. The presence of a squamate petiole in *dogieli* is not enough by itself to confirm its placement in this group as a similarly shaped petiole is also encountered in the *weitzeckeri*-group, where the antennae are 11-merous.

However, working on circumstantial evidence that the antennae are 12-segmented, namely that Karavaiev placed the species in *Tetramorium* and stated that it ran to *squaminode* in Arnold's (1926) key, then following Karavaiev's description of *dogieli* it runs out to *nube* in the present key. The only characters which can be deduced to separate them are the differences in size (*dogieli* TL 2·5) and the fact that *dogieli* is stated as having the head between the eyes and the posterior portions of the frontal carinae superficially reticulate, whereas in *nube* this region of the head is longitudinally sculptured.

There is a very real possibility that if *dogieli* is correctly placed in the *squaminode*-group it may be a senior synonym of *nube*, but this conjecture will have to await the rediscovery of the holotype of *dogieli*.

Tetramorium flaviceps Arnold **stat. n.**

Tetramorium squaminode race *do* var. *flaviceps* Arnold, 1917: 316. Syntype workers, Rhodesia: Matopo Hills, World's View, 23.v.1915 (*G. Arnold*) (BMNH; NM, Bulawayo) [examined].

Tetramorium squaminode race *do* var. *mus* Arnold, 1917: 316. Syntype workers, Rhodesia: Bulawayo, Hillside, 23.i.1916 (*G. Arnold*) (BMNH) [examined]. [Name unavailable.]

Tetramorium do var. *flaviceps* Arnold; Arnold 1960*b*: 82.

Worker. TL 2·4–3·2, HL 0·60–0·76, HW 0·57–0·72, CI 90–95, SL 0·40–0·54, SI 68–75, PW 0·44–0·54, AL 0·68–0·86 (20 measured).

Mandibles usually unsculptured with scattered fairly large pits, but in some faint traces of very fine longitudinal striation are visible. Anterior clypeal margin entire or at most with a vestigial median impression, sometimes only visible with the mandibles open. Frontal carinae gently sinuate, reaching back almost to the occiput. Antennal scrobes shallow but broad and conspicuous. Maximum diameter of eye 0·16–0·19, about 0·26–0·29 × HW. Propodeal spines long and strong, metapleural lobes low and triangular. Petiole squamiform, in profile much higher than long and narrowly rounded above, in dorsal view much broader than long. Postpetiole in profile slightly antero-posteriorly compressed, lower than the petiole and more broadly rounded, its ventral process with sharp anteroventral angle, not a rounded lobe. Postpetiole in dorsal view much broader than long, slightly broader than the petiole. Head sparsely but usually quite sharply longitudinally rugulose, with a few anastomoses or a feeble reticulum occipitally. In some specimens the rugulae reduced and quite weak mediodorsally, becoming stronger posteriorly. Ground-sculpture of head a conspicuous punctulation. Dorsal alitrunk predominantly longitudinally rugulose with a number of cross-meshes on the promesonotum, but in some the rugulae reduced and faint in places. Petiole, postpetiole and gaster unsculptured. All dorsal surfaces of head and body with numerous short, quite stout, blunted hairs. Scapes and tibiae with short decumbent to appressed pubescence only. Colour light yellowish brown, the gaster a much darker shade of brown.

Within the *squaminode*-complex *flaviceps* is most closely related to *jejunum* and the two together form a close pair which is best separated from allied forms by a lack of specialized characters rather than their development. Thus *squaminode, umtaliense, platynode* and *nube* have strongly sculptured mandibles; *matopoense* lacks sculpture on the pronotum; *akermani* has abundant long fine pilosity; *frigidum* is very size-variable and has very sharply defined sculpture and *do* has the postpetiole almost as strongly squamate as the petiole. By comparison *flaviceps* and *jejunum* have the mandibles feebly sculptured at most (usually smooth), have pronotal sculpture present, are fairly consistent in size, with irregular sculpture, lack elongate fine pilosity and do not have the postpetiole squamiform.

Differences separating *jejunum* and *flaviceps* may be tabulated as follows.

flaviceps	*jejunum*
Yellowish brown with much darker gaster.	Uniform clear pale yellow.
Postpetiole in profile feebly antero-posteriorly compressed.	Postpetiole in profile not antero-posteriorly compressed, evenly rounded.
Frontal carinae more widely separated; at level of mid-length of eye their distance apart is 0·64–0·70 × HW.	Frontal carinae less widely separated; at level of midlength of eye their distance apart is 0·55–0·60 × HW.
Ground-sculpture of head between rugulae a conspicuous punctulation.	Ground-sculpture of head between rugulae superficial, faint and inconspicuous.
Anterior clypeal margin without a narrow projecting apron.	Anterior clypeal margin with a narrow projecting apron.

Material examined

Rhodesia: Lonely Mines (*H. Swale*); Bulawayo (*G. Arnold*); Hillside, Bulawayo (*G. Arnold*).

Tetramorium frigidum Arnold **stat. n.**

Tetramorium akermani var. *frigidum* Arnold, 1926: 266. Syntype workers, SOUTH AFRICA: Cape Prov., Hex Riv. Mts, Matroosberg 5000–7000 ft [1520–2130 m], i.1917 (*R. W. Tucker*) (BMNH; NM, Bulawayo) [examined].

Tetramorium akermani var. *drakensbergensis* Arnold, 1926: 267. Syntype workers, SOUTH AFRICA: Mts of Natal, 5300 ft [1610 m], iv.1898 (*Haviland*) (BMNH) [examined]. **Syn. n.**

WORKER. TL 2·7–4·0, HL 0·66–0·92, HW 0·58–0·88, CI 89–97, SL 0·44–0·70, SI 71–79, PW 0·42–0·66, AL 0·72–1·10 (20 measured).

Mandibles smooth or with faint longitudinal striation. Anterior clypeal margin with a distinct median notch or impression. Frontal carinae sinuate, strongly developed and reaching back almost to the occipital margin; surmounted by a raised rim or flange which becomes weaker behind the level of the eyes and occipitally has faded out or is no more strongly developed than the remaining cephalic sculpture. Antennal scrobes shallow but broad and conspicuous. Eyes moderately sized, maximum diameter 0·16–0·20, about 0·22–0·24 × HW. With alitrunk in profile the metanotal groove usually shallowly impressed, this being more distinct in larger specimens. Propodeal spines long and strong, the metapleural lobes low and triangular. Petiole squamiform, in profile much higher than long and in dorsal view much broader than long. Postpetiole in profile low and broadly rounded, in dorsal view much broader than long and slightly broader than the petiole. Dorsum of head with sharply defined strong, longitudinal, quite regular rugulae, the spaces between which are only superficially sculptured and glossy. The longitudinal rugulae run from the posterior clypeal margin to the rim of the occipital foramen without cross-meshes and without developing a reticulum occipitally. Dorsal alitrunk predominantly longitudinally rugulose, usually with a few cross-meshes, especially on the anterior pronotum. Petiole, postpetiole and gaster unsculptured. All dorsal surfaces of head and body with numerous short, quite stout hairs, most or all of which are blunted apically. Scapes and tibiae only with fine, short decumbent to appressed pubescence. Colour uniform light brown.

This species shows a greater size-variation than is usual in members of the *squaminode*-group. For instance, the type-series of the var. *drakensbergensis*, a straight synonym of *frigidum*, has the range HL 0·66–0·90, HW 0·58–0·86, SL 0·44–0·62. Some minor variations occur between the extremes of this range. The metanotal groove is better defined in larger than in smaller specimens, and also in larger workers the strong cephalic sculpture is more sharply defined. On the other hand, ground-sculpture on the head is fainter in smaller individuals and the incidence of cross-meshes on the sculpture of the alitrunk is distinctly less.

Within the *squaminode*-group *frigidum* is closest related to *flaviceps* and *jejunum*, but in both these species the size-range in a given series is by no means as marked as in *frigidum*, the eyes are relatively large (0·26–0·29 × HW) as compared to *frigidum* (0·22–0·24 × HW) and the sculpture of the head is much less regular and nowhere near as sharply defined as in *frigidum*.

MATERIAL EXAMINED

South Africa: Natal, Durban (*Merve*); Natal, Slievyre (*Haviland*); Natal (*Haviland*); Cape, Grahamstown (*W. L. Brown*).

Tetramorium jejunum Arnold

Tetramorium jejunum Arnold, 1926: 267, fig. 74. Syntype workers, RHODESIA: Sawmills, Umgusa Riv., 1.v.1917 (*G. Arnold*) (BMNH) [examined].

WORKER. TL 2·7–3·2, HL 0·65–0·74, HW 0·58–0·66, CI 86–92, SL 0·47–0·54, SI 79–84, PW 0·44–0·52, AL 0·78–0·88 (12 measured).

Mandibles unsculptured or at most with the faintest traces of extremely fine striation. Anterior clypeal margin usually entire and with a very narrow projecting apron or flange, but in some this anterior apron is shallowly indented medially. Frontal carinae long and gently sinuate, extending back almost to the occipital margin, broadest at the level of the midlength of the eyes where the distance separating them is 0·55–0·60 × HW. Antennal scrobes shallow but broad and conspicuous. Eyes with maximum diameter 0·16–0·18, about 0·27–0·28 × HW. Metanotal groove feebly impressed in profile. Propodeal spines long and acute, the metapleural lobes low and triangular. Petiole thickly squamate, in profile much higher than long, the anterior and posterior faces converging dorsally but the latter slightly convex and rounding into a short, sloping dorsal face. Postpetiole in profile low, broadly and quite evenly rounded. In dorsal view both pedicel segments broader than long, the postpetiole broader than the petiole. Subpostpetiolar process produced into a short, freely projecting anteroventral lobe on each side. Dorsum of head with irregular, widely spaced longitudinal rugulae, without cross-meshes except occipitally where a few are present. At the level of the eyes only 5–7 longitudinal rugulae present between the frontal carinae which are not nearly so strongly developed as the carinae. Spaces between rugulae with inconspicuous and feeble ground-sculpture. Dorsal alitrunk irregularly but predominantly longitudinally rugulose, with a number of cross-meshes. Petiole, postpetiole and gaster unsculptured. All dorsal surfaces of head and body with short, stout, usually blunted hairs. Scapes and tibiae only with short decumbent to appressed pubescence. Colour a uniform clear pale yellow.

A discussion of the affinities and the separation of *jejunum* from its closest ally *flaviceps* is given under the last-named species.

MATERIAL EXAMINED

Rhodesia: Sawmills (*G. Arnold*).

Tetramorium matopoense Arnold

Tetramorium matopoensis Arnold, 1926: 254, fig. 68. Syntype workers, RHODESIA: Matopos, Mt Bambata, 4800 ft [1460 m], 5.vi.1918 (*G. Arnold*) (NM, Bulawayo) [examined].

WORKER. TL 2·5–2·6, HL 0·62–0·64, HW 0·56–0·58, CI 90–91, SL 0·44–0·48, SI 79–82, PW 0·42–0·44, AL 0·66–0·68 (2 measured).

Mandibles unsculptured except for scattered pits, anterior margin of clypeus with a shallow median notch. Frontal carinae sinuate and strongly developed. Antennal scrobes broad and shallow. Occipital margin in full-face view flat or at most only very feebly concave medially. Metanotal groove feebly impressed in profile. Propodeal spines strong, acute, broad basally. Petiole squamiform, the dorsal crest narrow but not knife-like, flat in posterior view. Postpetiole slightly antero-posteriorly compressed but by no means squamate, the dorsum evenly convex in profile. Clypeus without transverse rugulae. Dorsum of head feebly longitudinally rugulose, the spaces between them faintly superficially sculptured. Pronotal dorsum absolutely smooth, devoid of sculpture, the remainder of the dorsal alitrunk with weak and disorganized rugular and punctulate sculpture. Pedicel segments and gaster unsculptured, smooth and shining. Dorsal surfaces of head, alitrunk and pedicel segments with scattered long hairs which are quite stout and tend to be blunt apically, the head also with a number of shorter, finer hairs. First gastral tergite without pilosity. Appendages only with fine, appressed pubescence. Colour uniform and brown, the appendages a lighter, more yellowish brown.

T. matopoense is easily recognized within the *squaminode*-group by its smooth pronotum coupled with the lack of hairs on the first gastral tergite. All other known species of the group have pronotal sculpture and gastral pilosity present.

Tetramorium nube Weber **stat. n.**

(Fig. 39)

Tetramorium squaminode subsp. *nubis* Weber, 1943: 369, pl. 16, fig. 24. Syntype workers, SUDAN: Imatong Mts, Mt. Kineti, 9200 ft [2800 m], 28.vii.1939, no. 1355 (*N. A. Weber*) (MCZ, Cambridge) [examined].

WORKER. TL 3·2–3·4, HL 0·78–0·80, HW 0·72–0·75, CI 92–94, SL 0·56–0·57, SI 76–78, PW 0·56–0·58, AL 0·90–0·94 (2 measured).

Mandibles coarsely longitudinally striate. Anterior clypeal margin with a very shallow median impression. Frontal carinae widely separated and broadly sinuate, strongly developed and reaching back almost to the occipital margin. Antennal scrobes shallow but broad and conspicuous. Maximum diameter of eye 0·16–0·17, about 0·22–0·23 × HW. Dorsal alitrunk evenly rounded in profile, the metanotal groove not impressed. Propodeal spines long and acute, the metapleural lobes low and triangular. Petiole squamiform, in profile much higher than long, the peduncle of the petiole equipped ventrally with a broad laminar carina which is semitranslucent. Postpetiole in profile low and broadly rounded, without lobate ventral processes. In dorsal view both pedicel segements much broader than long, the postpetiole slightly broader than the petiole. Dorsum of head finely and quite densely irregularly longitudinally rugulose, with 10–12 rugulae between the frontal carinae at the level of the eyes. Cross-meshes absent except on the occiput where a few anastomoses are developed, but this area without a rugoreticulum. Ground-sculpture of head an inconspicuous punctulation, the spaces between the rugulae glossy. Dorsal alitrunk predominantly longitudinally rugulose but with a few cross-meshes, especially noticeable on the anterior pronotum. Petiole, postpetiole and gaster unsculptured. All dorsal surfaces of head and body with numerous stout blunted hairs but the scapes and tibiae only having short appressed or decumbent fine pubescence. Colour dark brown, the gaster slightly darker in shade than the head and alitrunk.

T. nube, known only from the type-collection made in Sudan, is the most northerly known representative of this group.

The dark colour, strongly sculptured mandibles and blunt body pilosity allies *nube* most closely with *squaminode* and *platynode*. The latter is quickly separated as in *platynode* the postpetiole is sculptured and very broad (about 0·76 × PW), and the ventral margin of the peduncle of the petiole is concave in profile. In contrast the postpetiole in *nube* is smooth and much narrower (about 0·66 × PW), and the ventral margin of the peduncle of the petiole is more or less straight in profile due to the presence of the laminar carina.

T. squaminode separates from *nube* by having the dorsum of the petiole very narrow, in fact ending dorsally in a knife-edged crest, whereas in *nube* the scale is rounded above.

***Tetramorium platynode* sp. n.**

(Figs 35, 38)

HOLOTYPE WORKER. TL 3·3, HL 0·78, HW 0·72, CI 92, SL 0·58, SI 81, PW 0·58, AL 0·94.

Mandibles longitudinally striate, clypeus with a shallow median impression. Frontal carinae strongly developed, reaching back almost to occipital margin and markedly sinuate along their length, widest at the level of the eyes. Antennal scrobes well developed. Eye of moderate size, maximum diameter 0·17, about 0·24 × HW, situated at the midlength of the sides of the head. Occipital margin shallowly concave medially in full-face view, the sides shallowly convex. Outline of dorsal alitrunk in profile feebly impressed at metanotal groove. Propodeal spines long, stout and acute, very broad basally; metapleural lobes triangular, short and acute. Petiole squamiform, shaped as in Fig. 38; in dorsal view very broad, measuring *c*. 0·45, about 0·76 × PW. Postpetiole nodiform in profile but very broad in dorsal view and with an irregular lateral outline. Clypeus with the median carina intersected at about its midlength by an irregular transverse rugule which runs from one lateral longitudinal carina to the other. Head with sharp and widely spaced fine longitudinal rugulae, the spaces between them almost smooth, with only the faintest traces of surface sculpture remaining. Cross-meshes absent except on occiput where a feeble reticulum is present. Promesonotal dorsum with a loose, irregular ruguloreticulum the meshes of which are fine and widely spaced; spaces enclosed by the meshes virtually smooth. Petiole with only the faintest traces of sculpture but the postpetiole with a few rugulae and a number of raised welts, the surfaces with very feeble punctulation, effaced in places. First gastral tergite unsculptured. All dorsal surfaces of head and body with numerous hairs which are quite stout and are blunt or truncated apically. Appendages with fine appressed pubescence only. Colour uniform mid-brown, the head and gaster slightly darker in shade than the alitrunk and pedicel, appendages lighter brown.

Holotype worker, **South Africa**: Cape, Gwanga Drift, Peddie (*B. Marais*) (BMNH).

The holotype worker of this species was removed from a card of AM, Grahamstown material containing a number of workers of *T. quadrispinosum* and was obviously collected as a stray along with the *quadrispinosum* sample. Dr C. F. Jacot-Guillarmod of AM, Grahamstown has kindly consented to the deposition of the holotype in BMNH collection.

The species most closely related to *platynode* is *nube* of Sudan, but in that species the postpetiole is completely devoid of sculpture and the pedicel segments are much less strongly developed.

***Tetramorium repentinum* Arnold**

(Figs 34, 37)

Tetramorium repentinum Arnold, 1926: 257, fig. 70. Syntype workers, RHODESIA: Umtali, 9.vi.1920 (*G. Arnold*); and Umgusa Riv., Sawmills 30.i.1918 (*G. Arnold*) (NM, Bulawayo; BMNH; MCZ, Cambridge) [examined].

WORKER. TL 3·0–3·4, HL 0·74–0·82, HW 0·72–0·86, CI 97–104, SL 0·50–0·58, SI 67–72, PW 0·50–0·62, AL 0·82–0·90 (10 measured).

Mandibles smooth and shining, the two apical teeth large, much larger than the third. Anterior clypeal margin entire, in most individuals with a small triangular projection medially. Frontal carinae strongly developed, more or less straight, strongly divergent posteriorly and directed towards the occipital corners. Antennal scrobes deep, long and conspicuous, running to the occipital corners behind the eyes. Eyes situated well back on sides of head, distinctly behind the midlength of the sides. Maximum diameter of eyes 0·18–0·22, about 0·25–0·27 × HW. With the head in full-face view the occipital margin shallowly concave, the occipital corners evenly rounded and the sides markedly convergent anteriorly. Alitrunk in profile with the metanotal groove impressed. Propodeal spines stout and strong, the metapleural lobes low and triangular. Petiole strongly squamiform, in profile high and narrow with a very narrow dorsum. Postpetiole in profile lower and much more broadly rounded than the petiole, the sternal portion produced into a freely projecting lobe on each side below the laterally projecting tergite. In dorsal view both nodes very much broader than long, the postpetiole distinctly much more massive than the petiole. Dorsum of head densely and sharply longitudinally rugulose, the rugulae regular, almost straight, and continuous from the anterior clypeal margin to the occiput, without cross-meshes. Posterior margin of clypeus not or only very feebly marked, not interrupting the sculpture. Spaces between the rugulae smooth. Sides of head similarly evenly sculptured. Dorsal alitrunk usually with disorganized fine rugosity. In some individuals an irregular rugoreticulum may be present on the promesonotum but in others the sculpture is finer and predominantly longitudinal, but this sculpture is not as regular or as sharply defined as that on the head. Petiole, postpetiole and gaster unsculptured. All dorsal surfaces of head and body with numerous hairs which tend to be stout and blunted apically. Scapes and tibiae only with appressed minute pubescence. Colour glossy mid-brown, the gaster usually darker brown.

Within the *squaminode*-group the two species *repentinum* and *sitefrum* form a distinctive complex characterized by the position of their eyes well behind the midlength of the sides of the head and their more or less straight and strongly divergent frontal carinae. Besides this they share a number of other characters such as smooth mandibles, lack of a median clypeal impression (in both there is a tendency for the median area of the clypeus to project slightly), deep antennal scrobes and very regular dense cephalic sculpture.

The two species are very closely related and separation rests upon characters of sculpture and pilosity. In *sitefrum* the pilosity is dense and quite long, the hairs of the first tergite being very numerous and longer than the vertical diameter of the eye. Coupled with this the alitrunk in *sitefrum* is very coarsely reticulate-rugose and the dorsum of the postpetiole retains traces of sculpture, whereas this segment is smooth in *repentinum*. Finally the regular longitudinal sculpture of the cephalic dorsum is finer and more closely packed in *repentinum*, coarser and more widely separated in *sitefrum*.

Arnold (1926) stresses that *repentinum* feeds on other ants, usually on small *Pheidole* species, and states that the ground around the nest entrances were strewn with the carcases of other ants.

MATERIAL EXAMINED

Rhodesia: Umtali (*G. Arnold*).

Tetramorium sitefrum sp. n.

HOLOTYPE WORKER. TL 3·1, HL 0·77, HW 0·76, CI 99, SL 0·54, SI 71, PW 0·54, AL 0·82.

Mandibles smooth and highly polished. Anterior clypeal margin entire, without a notch or impression, the margin itself transverse and feebly sinuate medially, with a low anteromedian prominence (better developed in paratypes than in holotype). Frontal carinae strongly divergent posteriorly, directed towards the occipital corners. Antennal scrobes strongly developed, conspicuous. Eyes situated well back on sides of head, distinctly behind the midlength of the sides close to the occipital corners. Maximum diameter of eye 0·18, about 0·24 × HW. With the head in full-face view the occipital margin more or less straight, the occipital corners rounded. Head broadest behind the eyes, narrowing slightly anteriorly, the head itself varying from very nearly as broad as long to slightly broader than long (CI in all specimens 99–102). Posterior margin of clypeus very feebly marked, not interrupting the sculpture. Pronotal angles narrowly rounded in dorsal view. In profile the metanotal groove shallowly impressed, the propodeal dorsum forming a low peak behind the groove and thereafter sloping down to the long, stout propodeal spines. Metapleural lobes low and short-triangular. Petiole squamiform, very high and narrow in profile and very much broader than long in dorsal view. Postpetiole in profile broadly rounded above; the sternum forming a freely projecting lobate process on each side which is overhung by the lateral projections of the more massively developed tergum. In dorsal view the postpetiole broadly roughly ovate, much broader than long and broader than the petiole. Dorsum of head sharply and regularly longitudinally strongly rugulose, the constituents of the sculpture running unbroken from clypeus to occiput, diverging posteriorly but without cross-meshes anywhere. Spaces between the rugulae smooth and shining. Sides of head similarly but more finely sculptured. Dorsal alitrunk coarsely reticulate-rugose, the meshes irregular. Dorsum of postpetiole punctulate or shagreened. Petiole and gaster unsculptured but with the faintest traces of shagreening visible on the posterior surface of the petiole and close to the gastral base. All dorsal surfaces of head and body with numerous hairs, densest on the first gastral tergite where the longest hairs are about equal to the vertical diameter of the eye or slightly longer. Longest hairs on pronotum distinctly longer than those on the gaster. Scapes and tibiae only with appressed very short pubescence. Colour uniform dark brown, the gaster blackish brown.

PARATYPE WORKERS. As holotype, with the variation in anterior clypeal margin noted above and slightly larger than the holotype. TL 3·3–3·6, HL 0·80–0·82, HW 0·81–0·84, CI 101–102, SL 0·56–0·59, SI 69–70, PW 0·57–0·59, AL 0·86–0·88. The eyes have maximum diameter *c.* 0·20, about 0·24–0·25 × HW (2 measured).

Holotype worker, **Ghana**: Tafo, 17.ix.1970, under rotten cocoa pod on ground (*B. Bolton*) (BMNH).

Paratypes. **Ghana**: 1 worker with same data as holotype; 1 worker, Mampong, 27.vii.1970 (*P. Room*) (BMNH; MCZ, Cambridge).

T. sitefrum is the only species of the *squaminode*-group known to occur in West Africa and as such should not be confused with any other species. Its closest relative is *repentinum* of Rhodesia and a discussion of both species is given there.

Tetramorium squaminode Santschi

(Fig. 31)

Tetramorium squaminode Santschi, 1910*b*: 356, fig. Holotype worker, TANZANIA: Kilimanjaro, 3800 m, 1904 (*C. Alluaud*) (NM, Basle) [examined].

WORKER. TL 3·3–3·9, HL 0·78–0·85, HW 0·73–0·81, CI 93–95, SL 0·54–0·62, SI 74–78, PW 0·52–0·58, AL 0·86–0·96 (5 measured).

Mandibles finely longitudinally striate. Anterior clypeal margin with a median impression, in most specimens the strongly descending anterior portion of the clypeus feebly concave medially. Frontal carinae long, strongly developed to a point behind the level of the posterior margins of the eyes but occipitally no stronger than the remaining cephalic sculpture. Antennal scrobes broad and shallow. Maximum diameter of eye 0·17–0·20, about 0·23–0·25 × HW. Metanotal groove usually not impressed in profile but rarely the dorsum feebly indented. Propodeal spines long and acute, often slightly downcurved along their length in larger individuals. Metapleural lobes short-triangular and acute. Petiole very strongly squamiform; in profile high and very narrow, in dorsal view much broader than long. Transverse dorsal crest of petiole scale thin and sharp, knife-edged, not rounded. In large workers the centre of the petiole dorsal crest sometimes slightly indented. Postpetiole in dorsal view broader than long, slightly broader than the petiole. In profile the postpetiole low and broadly rounded, not squamiform, the tergal portion broader than the sternal and the anteroventral angle of the sternal process sharp, right-angled or nearly so. Dorsum of head irregularly longitudinally rugulose, the components quite widely separated and the spaces between them smooth or nearly so, ground-sculpture being feeble. Cross-meshes sparse or absent on dorsum but occipitally with some anastomoses or a weak reticulum developed. Dorsal alitrunk finely longitudinally rugulose, with transverse components sparse or absent except on the extreme anterior portion of the pronotum. Postpetiole and gaster unsculptured, smooth and shining. Petiole mostly unsculptured and smooth but the posterior face just above the point of articulation with the postpetiole having a row of very short vertical costulae, which are more apparent in larger workers. All dorsal surfaces of head and body with numerous quite short, stout hairs. Scapes and tibiae only with fine decumbent to appressed short pubescence. Colour brown.

The best diagnostic character of *squaminode* is its very narrow, dorsally knife-edged petiole scale. In other members of the group the dorsum of the scale is blunted or narrowly rounded, not sharp and acute.

MATERIAL EXAMINED
Tanzania: no loc. (*B. Cooper*).

Tetramorium umtaliense Arnold
(Figs 33, 36)

Tetramorium umtaliensis Arnold, 1926: 256, fig. 69. Syntype workers, RHODESIA: Umtali, 9.vi.1920 (*G. Arnold*) (BMNH; NM, Bulawayo) [examined].

WORKER. TL 2·8–3·2, HL 0·68–0·74, HW 0·59–0·68, CI 86–92, SL 0·47–0·52, SI 76–81, PW 0·47–0·55, AL 0·80–0·90 (8 measured).

Mandibles densely longitudinally striate. Anterior clypeal margin entire, without a median notch or impression. Frontal carinae strong and sinuate, reaching back almost to the occipital corners. Antennal scrobes not strongly developed but quite conspicuous, broad and shallow. Eyes at midlength of sides of head, maximum diameter 0·16–0·17, about 0·24–0·25 × HW. Metanotal groove feeble or not impressed in profile. Propodeal spines of moderate length, broad basally but rapidly tapering to an acute apex, distinctly much longer than the low, triangular metapleural lobes. Petiole squamiform, much higher than long in profile and with the dorsum of the scale narrowly but bluntly rounded. In dorsal view the petiole and postpetiole both distinctly much broader than long, the postpetiole broader than the petiole. Entire dorsum of head from posterior clypeal margin to occipital margin with a coarse rugoreticulum. Dorsal alitrunk everywhere irregularly reticulate-rugulose. Petiole and postpetiole with traces of rugular sculpture, sometimes vestigial but the pedicel segments never entirely smooth. Base of first gastral tergite with a radiating series of short but distinct costulae. All dorsal surfaces of head and body with numerous elongate hairs, predominantly erect or suberect and mostly blunted apically. Scapes and tibiae with short appressed pubescence only. Colour yellow, the gaster somewhat darker.

In the *squaminode*-complex of this group *umtaliense* is immediately recognizable as it is the only species in which the entire cephalic dorsum is covered by a rugoreticulum, the predominant sculpture elsewhere in the complex being of longitudinal rugulae with a reticulum, if present at all, being confined to the occipital region. Besides this *umtaliense* is the only species in the group at present to have basigastral costulae on the first tergite. Although these are short and are confined to the area immediately posterior to the postpetiole-gaster articulation they are very distinctive.

The *grassii*-group
(Figs 40–45)

Antennae with 12 segments. Sting appendage conspicuously spatulate. Anterior clypeal margin notched or impressed (faint or absent in *rugulare*). Frontal carinae strong, running back almost to occiput and surmounted by a rim or flange which is strong at least to the level of the posterior margins of the eyes. Antennal scrobes present. Petiole in profile a high, narrow node, much higher than long, not squamiform but narrow in posterior view. In dorsal view the petiole node somewhat broader than long. Petiole, postpetiole and gaster unsculptured. Pilosity dense on dorsal surfaces of head and body but the scapes and tibiae only with short subdecumbent to appressed pubescence.

This small group of five closely related species is restricted to southern Africa, most species being found only in South Africa itself. One species (*grassii*) has been introduced in New Zealand (Brown, 1958).

The *grassii*-group is possibly ancestral to the *weitzeckeri*- and *squaminode*-groups and is also closely related to the *schaufussi*-group of the Malagasy region.

T. grassii is the most widespread and also the most variable member of the group, being widely distributed in South Africa and also occurring in Swaziland. The other four species are each known from only one or two localities, mostly in South Africa, but at present *plumosum* has only been found in Swaziland.

Among the five species two (*titus* and *vexator*) form a close species-pair in which the mandibles are smooth, the propodeal spines short and the petiole node narrowed dorsally. In the remainder (*grassii, plumosum, regulare*) the mandibles are striate, the propodeal spines relatively long and the petiole not narrowed above. Of these three *plumosum* is very distinct as it is one of the few African *Tetramorium* species to show bizarre pilosity, in this case plumose apically. The final two are separated on details of structure and sculpture as noted in the key and in the discussions under the species.

Tetramorium grassii Emery
(Figs 40, 44)

Tetramorium grassii Emery, 1895: 37. Syntype workers and female, SOUTH AFRICA: Cape Town (worker) and Kimberley (female) (*E. Simon*) (MHN, Geneva) [worker examined].

Tetramorium grassii var. *laevigatum* Mayr, 1901*b*: 25. Syntype worker, SOUTH AFRICA: Natal, Pt Elizabeth (*H. Brauns*) (BMNH) [examined]. **Syn. n.**

Tetramorium joffrei Forel, 1914: 228. Syntype workers and females, SOUTH AFRICA: Natal, Durban, 14.i.1914 and iii.1914 (*G. Arnold*) (BMNH; MHN, Geneva; MCZ, Cambridge) [examined]. **Syn. n.**

Tetramorium grassii var. *simulans* Santschi, 1914*c*: 24. Syntype workers, SOUTH AFRICA: Natal, Richmond, 25.iii.1905 (*I. Trägårdh*) (NM, Basle) [examined]. **Syn. n.**

Tetramorium joffrei var. *algoa* Arnold, 1917: 304. Syntype workers and female, SOUTH AFRICA: Natal, Pt Elizabeth, ii.1915 (*H. Brauns*) (BMNH; MCZ, Cambridge) [examined]. **Syn. n.**

Tetramorium grazsii [sic] var. *mayri* Emery, 1922: 281. Holotype female, SOUTH AFRICA: Kimberley (*E. Simon*). **Syn. n.** [This var. based upon the female originally described by Emery, 1895: 37, as part of *grassii* type-series.]

WORKER. TL 3·0–4·1, HL 0·74–0·98, HW 0·66–0·90, CI 88–94, SL 0·59–0·80, SI 79–89, PW 0·48–0·68, AL 0·88–1·12 (40 measured).

Mandibles longitudinally striate, very coarsely so in some samples. Anterior clypeal margin with a median notch or impression which is usually distinct but which may be quite shallow in individuals. Frontal carinae long and sinuate, running back almost to the occipital margin. Frontal carinae surmounted by a raised rim or flange which is conspicuous to the level of the posterior margins of the eyes, behind which it rapidly becomes more feeble. Eyes of moderate size, maximum diameter 0·16–0·22, about 0·24–0·26 × HW. Alitrunk in profile usually with the metanotal groove impressed, but in smaller workers the impression may be feeble or even absent, leaving the dorsum more or less evenly convex. Propodeal spines long, narrow and acute, the length of the spines varying from series to series. Metapleural lobes low and triangular. Petiole in profile a high, narrow node, its thickness varying even in members of the same series but always with the height of the tergal portion greater than the dorsal length. Anterior and posterior faces of the node usually slightly convergent dorsally and the posterodorsal angle more broadly rounded than the anterodorsal. Node of postpetiole in dorsal view high and quite narrowly rounded above. In dorsal view both the petiole and postpetiole broader than long. Dorsum of head sculptured with irregular, broken or wandering longitudinal rugulae, with 7–10 of them present between the frontal carinae at the level of the eyes. In larger specimens the rugulae are more strongly developed than in smaller and in some a few feeble cross-meshes may be present on the dorsum, although an occipital reticulum is never developed. Dorsal alitrunk irregularly rugulose, the rugulae often predominantly longitudinal but many individuals with a loose, open or irregular reticulum. In many populations there is a tendency for the rugulae on the promesonotum to be reduced in density and intensity or even effaced, so that individuals occur in which the alitrunk is mostly or entirely smooth dorsally. In a majority of cases such a reduced sculpture predominates in small workers, but this is by no means unanimous as occasional larger workers can be found in which the alitrunk is almost smooth. Petiole, postpetiole and gaster unsculptured, smooth and shining. All dorsal surfaces of head and body with numerous fine hairs which are acute apically. Scapes and tibiae only with fine decumbent to appressed short pubescence. Colour uniform brown, varying from mid-brown to blackish brown.

A fairly common and widespread species in South Africa, *grassii* has also been introduced into New Zealand, where it appears to be the only established tetramoriine (Brown, 1958; Bolton, 1977). It is fairly variable as regards propodeal spine length, degree of impression of metanotal groove and density and intensity of sculpture, but its diagnostic features, as noted in the group-diagnosis and above, are consistent.

Within the group *grassii* is closest related to *regulare* but in the latter species the head has very regular, sharply defined cephalic sculpture and the dorsal pilosity is thicker than in *grassii* and distinctly blunted.

MATERIAL EXAMINED

South Africa: Cape, Table Mt (*G. Arnold*); Cape Prov., Grahamstown, Beggar's Bush (*W. L. Brown*); Grahamstown, Southwell Rd (*W. L. Brown*); Cape Prov., Pt Elizabeth (*W. L. Brown*); Port Elizabeth (*H. Brauns*); Cape Prov., Hogsback (*W. L. Brown*); Cape Prov., Zuurberg (*Rattray*); Cape Prov., Mossel Bay (*R. E. Turner*); Cape Town (*M. C. Day*); Transvaal, Drakensberg Mts, Klaserie (*E. S. Ross & R. E. Leech*); Natal, Durban (*F. W. B. Marley*); Natal, Eshowe (*G. Arnold*); Natal, Transkop, Ekombe For. (*E. S. Ross & R. E. Leech*); Natal, Umkomaas R., Game Farm (*W. L. & D. E. Brown*); Natal, Pietermaritzburg (*W. L. & D. E. Brown*). **Swaziland**: King's Forest (*R. Ghent*). **New Zealand**: Auckland, Remuera (*K. P. Lamb*); Auckland, Panmure (*D. Spiller*).

***Tetramorium plumosum* sp. n.**

(Fig. 43)

HOLOTYPE WORKER. TL 3·7, HL 0·84, HW 0·76, CI 90, SL 0·66, SI 87, PW 0·54, AL 0·94.

Mandibles longitudinally striate. Anterior clypeal margin with a median impression. Frontal carinae sinuate, reaching back almost to the occiput, surmounted by a distinct ridge or flange to the level of the posterior margins of the eyes but posterior to this the flange quickly decreasing in height until no stronger than the remaining cephalic sculpture. Antennal scrobes broad but only shallow. Eyes of moderate size, maximum diameter 0·18, about 0·24 × HW. Occipital margin broadly and shallowly concave in full-face view. Propodeal spines elongate and narrow, the metapleural lobes low and broadly triangular. Petiole in profile with an elongate anterior peduncle, equipped beneath with a narrow sagittal crest. Node of petiole high and narrow in profile, the posterodorsal angle more broadly rounded than the anterodorsal. In dorsal view both petiole and postpetiole broader than long. Dorsum of head sculptured with sharply defined but irregular longitudinal rugulae, without cross-meshes except on the occiput where a few anastomoses (but no reticulum) are developed. 10–12 rugulae present between the frontal carinae at the level of the eyes and the spaces separating them are glossy, smooth or with only vestiges of faint superficial ground-sculpture. Dorsal alitrunk with irregular weak, disorientated rugulae which are widely spaced, and with scattered cross-meshes present. Spaces between rugulae smooth or very nearly so. Petiole, postpetiole and gaster unsculptured, shiny. All dorsal surfaces of head and body with numerous erect or suberect strong hairs, the apices of which are strongly and very distinctly plumose. Antennal scapes and tibiae only with short, fine, appressed pubescence. Colour uniform brown, the appendages lighter in shade than the body.

PARATYPE WORKERS. TL 3·6–3·8, HL 0·82–0·84, HW 0·73–0·78, CI 89–93, SL 0·64–0·68, SI 87–89, PW 0·50–0·55, AL 0·90–0·96. Ocular diameter 0·18–0·19, about 0·24–0·25 × HW (5 measured).

Holotype worker, **Swaziland**: King's Forest, 12.vii.1962 (*R. Ghent*) (MCZ, Cambridge).

Paratypes. 5 workers with same data as holotype (MCZ, Cambridge; BMNH).

The main diagnostic feature separating this species from other members of its group and also from most other species in the entire genus is the presence in *plumosum* of elongate plumose hairs. In *Tetramorium* generally, the presence of such bizarre pilosity is very rare, and in the Ethiopian region is only also known in *pinnipilum* and *flabellum*. The first of these belongs to the *weitzeckeri*-group and is separable by its 11-merous antennae, and the second belongs to the *flabellum*-group in which the sting appendage is dentate, not spatulate as in the members of the *grassii*-group. Within the group *plumosum* is closest related to *regulare* and *grassii* itself, but of course neither of these have plumose hairs.

***Tetramorium regulare* sp. n.**

(Fig. 45)

HOLOTYPE WORKER. TL 3·5, HL 0·79, HW 0·71, CI 90, SL 0·57, SI 80, PW 0·52, AL 0·92.

Mandibles longitudinally striate. Anterior clypeal margin entire, without a median impression but the margin centrally somewhat flattened. (In some paratypes an exceptionally feeble impression is visible.) Frontal carinae extending back almost to occiput, sharply defined and surmounted by a narrow raised rim or flange which is highest at the level of the eyes and becomes lower posterior to this, but is always more strongly defined than the remaining cephalic sculpture. Antennal scrobes present. Eyes moderate, maximum diameter 0·18, about 0·25 × HW. With the alitrunk in profile the metanotal groove very shallowly impressed, the propodeal dorsum sloping to a pair of long, stout spines. Metapleural lobes long triangular, acute apically and slightly upcurved along their length. Peduncle of petiole with a narrow sagittal crest ventrally. Node of petiole high and narrow, the tergal portion much higher than the dorsal length. In profile the anterodorsal angle more sharply rounded and on a slightly higher level than the posterodorsal, so that the dorsum slopes downwards behind to the very broadly rounded posterodorsal angle. In dorsal view both nodes broader than long. Clypeus with three longitudinal carinae, the median the strongest. Dorsum of head with regular, spaced, sharply defined carina-like rugulae which run uninterruptedly from clypeus to occiput without cross-meshes or anastomoses anywhere. 10–12 such carinate rugulae present between the frontal carinae at the level of the eyes. Spaces between the longitudinal components smooth, with only vestiges of ground-sculpture. Dorsal alitrunk less strongly and less regularly rugulose, with occasional cross-meshes, especially on the pronotum. Petiole, postpetiole and gaster unsculptured. All dorsal surfaces of head and body with numerous erect or suberect long stout hairs which are blunt apically. Scapes and tibiae with fine short pubescence, decumbent to appressed. Colour uniform yellowish brown.

PARATYPE WORKERS. TL 3·0–3·6, HL 0·70–0·80, HW 0·64–0·72, CI 89–92, SL 0·52–0·58, SI 77–82, PW 0·46–0·53, AL 0·82–0·94. Maximum diameter of eye 0·16–0·18, about 0·24–0·26 × HW (20 measured). As holotype but in some the clypeus with a further pair of carinae, much weaker than the principal three and usually incomplete. The anterior clypeal margin varies from entire and convex, through a majority of individuals in which the margin is flattened medially to a minority in which a feeble median impression can be seen.

Holotype worker, **South Africa**: Cape Prov., Grahamstown, Signal Hill, 10.ii.1969, under rock, pine-native scrub (*W. L. Brown*) (MCZ, Cambridge).

Paratypes. 4 workers with same data as holotype; 11 workers with same data but collected 20.ii.69, series M82; 5 workers and 4 males with same data but collected 18.ii.69, series M79 (*L. Weatherill & W. L. Brown*) (MCZ, Cambridge; BMNH; NM, Basle).

This yellowish brown species is closely related to *grassii* but differs from it by having stout, blunt pilosity rather than the long, acute hairs seen in *grassii*. The cephalic sculpture is more sharply defined and much more regular in *regulare*, and the clypeal notch, generally distinct in *grassii*, is here vestigial or absent.

Tetramorium titus Forel
(Fig. 41)

Tetramorium titus Forel, 1910*b*: 427. Holotype worker, SOUTH AFRICA: Natal (*Wroughton*) (MHN, Geneva) [examined].

WORKER. TL 3·6, HL 0·80, HW 0·79, CI 98, SL 0·54, SI 68, PW 0·52, AL 0·96.

Mandibles smooth and shining with scattered small pits. Anterior clypeal margin with a median notch or impression. Head relatively short and broad, CI approaching 100, and the scapes relatively short, SI 68. Frontal carinae strongly developed, extending back almost to the occiput, sinuate and broadest at the level of the eyes where they are *c.* 0·45 across, about 0·57 × HW. Eyes moderate, maximum diameter 0·20, about 0·25 × HW. Alitrunk in profile with promesonotum more or less evenly convex, the metanotal groove strongly impressed. Propodeum rising slightly from metanotal groove, then sloping downwards to the base of the short, acute, broad-based propodeal spines. Mesopleuron retaining a weak suture dividing it into an- and katepisterna. Petiole in profile high and narrow, the height of the tergum much greater than the dorsal length, the shape as in Fig. 41. Petiole in posterior view with the node high, narrow and almost columnar, with a rounded top and sides which are only feebly convergent dorsally. Clypeus with median carina absent. Dorsum of head with meandering longitudinal rugulae which run from clypeus to occiput without cross-meshes or anastomoses. Promesonotal dorsum mostly smooth, with only a few faint longitudinal rugulae which become progressively stronger towards the metanotal groove; spaces between these rugulae smooth. Petiole, postpetiole and gaster smooth and unsculptured. All dorsal surfaces of head and body with numerous long, fine, soft hairs which are acute apically. Scapes and tibiae with long, subdecumbent to decumbent pubescence.

Within the group *titus* is closest related to *vexator* with which it shares the characters of smooth mandibles, long pilosity and notched clypeus. However, *vexator* is a more strongly sculptured species with a more modified petiole node in which the dorsal and posterior faces have been united to form a single steep convexity, the highest point of which is the anterodorsal angle (compare Figs 41 and 42).

Tetramorium vexator Arnold

(Fig. 42)

Tetramorium vexator Arnold, 1926: 269, fig. 76. Holotype worker, SOUTH AFRICA: Pietermaritzburg, 1.vii.1917 (*C. Akerman*) (NM, Bulawayo) [examined].

WORKER. TL 3·7–4·3, HL 0·92–1·02, HW 0·90–0·98, CI 93–98, SL 0·62–0·72, SI 66–73, PW 0·58–0·66, AL 1·02–1·12 (11 measured).

Mandibles smooth and shining with scattered pits. Anterior clypeal margin notched or impressed medially. Frontal carinae extending back almost to occiput, more strongly developed anteriorly, surmounted by a narrow raised rim or flange which is highest at the level of the eyes and becomes lower posteriorly. Antennal scrobes present but shallow. Eyes relatively small for a member of this group, maximum diameter 0·19–0·22, about 0·21–0·23 × HW. With the alitrunk in profile the metanotal groove impressed, usually only shallowly so but very distinctly so in some individuals. Propodeal spines stout, triangular and acute but quite short, their length about 0·14–0·16, distinctly shorter than the maximum diameter of the eye. Metapleural lobes low and broadly triangular. Petiole in profile high and narrow, roughly cuneate, much narrower above than below. Anterior face rising to a high anterodorsal angle which is the highest point of the node. Behind this the dorsal and posterior faces are united in an evenly convex shallowly curved surface which slopes away from the anterior face. In dorsal view both nodes are broader than long. Seen from behind the petiole node is high and narrow, its sides feebly convergent dorsally. Dorsum of head finely and densely longitudinally rugulose, the rugulae running from clypeus to occiput without cross-meshes or reticulation. Most individuals with 14–17 rugulae between the frontal carinae at the level of the eyes but one or two specimens with slightly more (holotype with 15). Spaces between the rugulae narrow, with superficial ground-sculpture. Dorsal alitrunk with fine, feeble longitudinal rugulae which are wider-spaced than those on the head; cross-meshes absent. Petiole, postpetiole and gaster unsculptured. Pilosity on dorsal surfaces of head and body long, fine, dense and acute apically; the first gastral tergite most densely hairy. Colour in samples examined uniform dark brown to blackish brown, but the holotype paler, yellowish brown, which leads me to suspect that the holotype is a teneral worker.

A fairly distinctive species in the group, characterized by its smooth mandibles, notched clypeus, dense cephalic sculpture and uniquely shaped petiole.

MATERIAL EXAMINED

South Africa: Cape Prov., Grahamstown, commons W. of town (*W. L. Brown*); Grahamstown, kloof off Southwell Rd (*W. L. Brown*).

The ***bicarinatum***-group

(Figs 46–51)

Antennae with 12 segments. Sting appendage triangular, dentate or pennant-shaped. Anterior clypeal margin with a median notch or impression. Median portion of clypeus usually with three strong longitudinal carinae, often without other sculpture but sometimes with extra, more feeble carinae or rugulae present (carinae reduced in *emeryi* and *erectum*). In African species the median portion of the clypeus marginate laterally, especially in larger species, the margination of a raised rim or flange which runs to the anterior clypeal margin and posteriorly is continuous with the frontal carinal lobes and thus with the frontal carinae themselves. Mandibles smooth in all African species except the introduced *bicarinatum*. Frontal carinae strongly developed, dorsally with a raised rim or flange, reaching back almost or quite to the occipital margin. Propodeal spines usually strongly developed (not in *emeryi*), straight or somewhat upcurved along their length. Petiole nodiform. First gastral tergite commonly with basal costulae. Basic sculpture throughout the group is a strong rugoreticulum. Pilosity usually abundant on all dorsal surfaces of the body, the hairs long and strong; short, truncated hairs absent. Middle and hind tibiae equipped with numerous short but quite strong hairs which are subdecumbent to decumbent.

The Ethiopian region has nine native species and one introduced species described to date in this group. The *bicarinatum*-group is also strongly represented in the Oriental and Indo-Australian regions where 13 species are now known (Bolton, 1977; 1979), but endemic species of the group are absent from Australia and Madagascar. Two of the South East Asian species, *insolens* and *bicarinatum*, are accomplished tramps, and the second of them has been found (but only once) in South Africa where it was imported with some orchids from Burma.

The nine endemic African species fall into three species-complexes on morphological grounds, particularly on the construction of the petiole. The first of these, containing the species *emeryi* and *erectum*, is restricted to South Africa and is characterized by a large size (HW > 0·80) and by having the petiole node bluntly nodiform (Figs 47, 51) with rounded or blunted antero- and posterodorsal angles. The node itself is quite high and tends to narrow slightly from base to apex. Basigastral costulae tend to be few and weak and the spaces between them are shagreened or finely punctulate. The two members of this complex are also fairly well characterized within the group by the condition of the propodeal spines, which are reduced to minute teeth in *emeryi* and are strongly elevated in *erectum*, often having their apices directed vertically.

The second complex contains the three closely related species *cristatum*, *gazense* and *notiale*. Of these three *cristatum* is mostly confined to the forested or wooded parts of the northern half of the continent, ranging from Sudan to Zaire and from Ghana to Uganda. The second species has been found in southern Zaire, Rhodesia and Tanzania and *notiale* is predominantly a species of the southern half of the continent, ranging from Zaire to South Africa. The species are quite large (HW always > 0·70 and usually > 0·80) and have a petiole node which is roughly rectangular in profile (Fig. 49) with sharp, usually roughly right-angular antero- and posterodorsal angles. Basigastral costulae are sharply defined, fine and dense. The sculpture of these species is a dense, coarse rugoreticulum which extends dorsally from the occiput to the postpetiole. Differentiation of the species lies primarily upon their colouring, as discussed under *gazense*.

The third and final complex contains the four smaller species of the group (*amentete, peutli, phasias, pullulum*) which in general have HW < 0·70, rarely greater. The petiole node in profile is long and low (Figs 48, 50), with a projecting posterodorsal angle and with a tendency for the posterior face to be slightly longer than the anterior so that the dorsum is higher behind than in front. Development of basigastral costulae is variable in the complex but they are usually present. At present *amentete* is only known from West Africa, *peutli* and *pullulum* are widely distributed in West and Central Africa but *phasias* appears to be restricted to the southern part of the continent. Both *amentete* and *phasias* are strongly sculptured species, with a rugoreticulum which extends from occiput to postpetiole, whilst *peutli* and *pullulum* are less strongly sculptured, always with extensive shining areas and with the postpetiole dorsum not or only very feebly sculptured.

As mentioned above, *bicarinatum* has been found once in Africa, as an introduction from South East Asia. This species is easily distinguished from the native African forms as it has sculptured mandibles whereas all the endemics have the mandibles smooth and shining with scattered small pits.

Tetramorium amentete sp. n.

(Fig. 50)

HOLOTYPE WORKER. TL 3·3, HL 0·78, HW 0·63, CI 81, SL 0·54, SI 86, PW 0·49, AL 0·94.

Mandibles unsculptured, smooth and shining with scattered pits. Anterior clypeal margin with a distinct median impression and the steeply descending anterior portion of the clypeus slightly transversely concave between the strong lateral carinae. Median clypeal carina not reaching anterior margin, fading out at the top of the strongly inclined portion. (Longer in some paratypes but not reaching anterior margin.) Frontal carinae long, reaching back almost to occiput where they tend to be reduced in strength and merge with the reticular sculpture. Eyes relatively large, maximum diameter 0·20, about 0·31 × HW. Propodeal spines long and strong, slightly upcurved at the apex. Metapleural lobes elongate-triangular, slightly upcurved along their length. Petiole in profile strongly nodiform and characteristically shaped. The anterior face vertical or nearly so, meeting the dorsal surface in a right-angle or near right-angle. The dorsum behind this is long and convex, ending in a projecting posterodorsal angle which overhangs the gently concave posterior face. Posterior face of petiole somewhat longer than anterior so that the node is slightly higher behind than in front. In dorsal view the node slightly longer than broad, the postpetiole rugged and distinctly broader than long. Median portion of clypeus with three longitudinal carinae. Dorsum of head to level of eyes with five strong longitudinal rugae. From the level of the eyes to the occiput the dorsum reticulate-rugose. Dorsal alitrunk unevenly rugose, strongest on the pronotum. Dorsal surfaces of petiole and postpetiole very coarsely and closely rugose, appearing very rugged and rough. Base of first gastral tergite finely and very densely longitudinally costulate. All dorsal surfaces of head and body with abundant long, acute hairs. Posterior tibiae with short but strong subdecumbent to decumbent pilosity. Colour black, the appendages dark brown.

PARATYPE WORKERS. TL 3·1–3·6, HL 0·74–0·80, HW 0·58–0·66, CI 77–82, SL 0·50–0·56, SI 82–88, PW 0·46–0·50, AL 0·86–0·98. Maximum diameter of eye 0·18–0·20, about 0·29–0·32 × HW. (10 measured.) As holotype but some lighter in colour, being dark brown or blackish brown rather than black. In a few specimens feeble longitudinal rugulae occur between the five major rugae posteriorly but are so much weaker that there is no chance of confusion.

Holotype worker, **Ghana**: Tafo, 20.viii.1970, rotten branch on ground (*B. Bolton*) (BMNH).

Paratypes. **Ghana**: 4 workers with same data as holotype. **Ivory Coast**: 2 workers, Orstom Expt. Sta., 17 km W. of Abidjan, 7.i.1963, A4 (*W. L. Brown*); 4 workers, Tai Forest, 9.viii.1975, no. 6 (*T. Diomande*). (BMNH; MCZ, Cambridge; NM, Basle.)

Non-paratypic material examined. **Ghana**: Kukurantumi (*D. Leston*); Asamankese (*D. Leston*); Mampong (*P. Room*); Kade (*J. D. Majer*). **Ivory Coast**: Divo (*C. A. Collingwood*).

This small, darkly coloured species is closest related to *pullulum*, but in this latter species the pedicel segments are unsculptured and smooth dorsally, the alitrunk has extensive unsculptured areas and the costulae of the first gastral tergite which are so distinctive in *amentete* are faint and replaced to a great extent by punctulation in *pullulum*.

The two other small species in this group, *phasias* and *peutli*, both have the head and alitrunk yellow or orange, in the case of *peutli* this colour contrasting with the dark brown or black gaster.

Tetramorium bicarinatum (Nylander)

Myrmica bicarinata Nylander, 1846: 1061. Syntype workers, female, U.S.A.: California, 1840 (lost).

Tetramorium bicarinatum (Nylander); Mayr, 1862: 740. [For full statement of current synonymy of *bicarinatum*, application of the name and discussion, see Bolton, 1977: 94.]

WORKER. TL 3·4–4·5, HL 0·80–1·00, HW 0·68–0·86, CI 80–87, SL 0·54–0·68, SI 75–84, PW 0·50–0·62, AL 0·94–1·20 (114 measured).

Mandibles very finely and densely longitudinally striate. Anterior clypeal margin with a marked median notch or impression. Median portion of clypeus with three longitudinal carinae of about equal strength, a median and one on each side. Sometimes another carina present on each side of the median but these are very feeble by comparison and nearly always incomplete or broken. Frontal carinae strong, running back almost to the occiput and equipped above with a narrow, raised rim or flange. Maximum diameter of eyes 0·19–0·24, about 0·26–0·29 × HW. Pronotal angles sharp in dorsal view. Metanotal groove absent but some specimens with a shallow impression in the alitrunk outline at its approximate position. Propodeal spines in profile strong and acute, moderately long, varying from more or less straight to slightly upcurved along their length. Metapleural lobes elongate-triangular and upcurved. Petiole node in profile roughly rectangular, with parallel or almost parallel anterior and posterior faces and an evenly convex dorsum which meets each face in an angle. The anterodorsal and posterodorsal angles of the node in profile are on a level as the dorsum of the node does not slope upwards posteriorly. Dorsum of head with scattered irregular longitudinal rugae with a few cross-meshes but behind the level of the eyes with a strong rugoreticulum. Ground sculpture between rugae superficial and inconspicuous. Dorsum of alitrunk, petiole and postpetiole reticulate-rugose, the sides of the pedicel segments similarly sculptured. Gaster unsculptured for the most part but nearly always with some short, fine basal costulae on the first tergite. These may be faint but are only rarely completely absent. All dorsal surfaces of head and body with numerous erect or suberect hairs, those projecting from the dorsum of the frontal carinae between the antennal insertions and the occipital corner relatively short (by comparison with other species in the group), shorter than the maximum diameter of the eye. Tibiae of hind legs with short subdecumbent to decumbent hairs. Head, alitrunk, petiole and postpetiole varying from light yellow-brown to bright orange-yellow, the gaster always much darker, deep brown or blackish brown.

This species, formerly known as *T. guineense* (F.), is a highly successful tramp-species which appears to have originated in South East Asia. It is now reasonably common throughout the tropical and subtropical zones of the world except for the Ethiopian region, from which only a single sample is known (see below). These are labelled 'in hollow stems of an Orchid from Rangoon', and are thus an obvious introduction. The absence of *bicarinatum* from Africa is interesting when its success in the rest of the world is considered. It implies that the larger native species of this group (*notiale, emeryi, cristatum, gazense, erectum*) are able to exclude *bicarinatum* in some way, as Africa is the only continent where this species has not been found (it is present on Madagascar).

As noted above, *bicarinatum* is the valid name of the species formerly widely known as *guineense* (F.), and attention is called to the fact that most of the African species of this group were originally described as subspecies or varieties of *guineense*. It was shown (Bolton, 1977) that the types of *guineense* belonged in genus *Pheidole* and so the name *guineense* could not continue in use when referring to this *Tetramorium* species. A number of previously synonymized names were available, and the earliest of these became the valid name of the species: *bicarinatum*.

During the course of this study it became apparent that the earlier authors who had described African forms of this group had been wrong to associate them with *bicarinatum* as that species has sculptured mandibles and belongs to a South East Asian complex. All the African species have the mandibles smooth and form a tightly-knit cluster of species.

For further discussion of *bicarinatum* and its distribution see Bolton (1977; 1979).

MATERIAL EXAMINED

South Africa: Natal, Durban (*C. P. Merve*) [introduced from Burma].

Tetramorium cristatum Stitz **stat. n.**

(Fig. 49)

Tetramorium guineense var. *cristatum* Stitz, 1910: 144. Syntype workers, TOGO: Bismarckburg (*Conradt*) (MNHU, Berlin) [examined].

Tetramorium guineense subsp. *medje* Wheeler, 1922: 192. Syntype workers, ZAIRE: Medje, from stomach of toad (*Lang & Chapin*) (MCZ, Cambridge) [examined]. **Syn. n.**

Tetramorium guinense [sic] st. *cristatum* var. *ebangense* Santschi, 1937*a*: 233, fig. 3. Syntype workers, ANGOLA: Ebanga (*A. Monard*) (NM, Basle) [examined]. [Name unavailable.]

WORKER. TL 4·1–5·1, HL 0·94–1·20, HW 0·78–1·02, CI 81–87, SL 0·60–0·76, SI 73–81, PW 0·59–0·76, AL 1·08–1·40 (15 measured).

Mandibles smooth and shining with scattered pits. Anterior clypeal margin with a distinct median notch or impression. Clypeus with three strong longitudinal carinae, sometimes also with 1–2 more carinae which are, however, much more feeble. Sides of median portion of clypeus bounded by a narrow raised longitudinal rim or flange which is continuous with the frontal carinae over the antennal insertions; the flanges indented at about the midlength of the clypeus. Frontal carinae long and strong, reaching back almost to the occipital margin but posteriorly tending to merge into the reticular sculpture. Maximum diameter of eye 0·22–0·28, about 0·27–0·30 × HW. Propodeal spines long and strong, with a marked tendency to be slightly upcurved along their length; only rarely are they more or less straight. Metapleural lobes elongate-triangular and upcurved, acute apically. Petiole node in profile roughly rectangular in shape, the anterior and dorsal surfaces meeting in a right-angle or near right-angle and the dorsum behind this shallowly convex. Posterodorsal angle of node more acute than anterodorsal, usually sharp and slightly overhanging the feebly concave posterior face. In dorsal view the petiole showing some variation in width, usually somewhat longer than broad but in several specimens only about as long as broad. Dorsum of head irregularly longitudinally rugose to level of eyes, often with some cross-meshes. Behind the level of the eyes the head strongly reticulate-rugose. Dorsal alitrunk reticulate-rugose and with a transverse, raised rugular crest at the promesonotal junction, the reticulum sometimes stronger in front of this ridge than behind. Petiole and postpetiole reticulate-rugose dorsally. First gastral tergite with conspicuous, fine dense basal costulae. All dorsal surfaces with numerous strong erect or suberect acute hairs. Hind tibiae with quite dense subdecumbent to decumbent short pilosity. Head, alitrunk and pedicel segments varying from bright orange-yellow to glossy orange-brown, the gaster always much darker, dark brown to blackish brown but generally with the extreme base of the gaster (where the costulae are densest) distinctly paler.

Five species of the *bicarinatum*-group, as represented in the Ethiopian region, are large. These are *gazense, emeryi, erectum, cristatum* and *notiale*. Of these the first three are uniform dark brown or blackish brown in colour whilst *notiale* is uniformly orange-brown or yellowish brown with the gaster the same colour as or lighter than the alitrunk and head. *T. cristatum*, with its strongly contrasting dark gaster, is thus quite distinct and easy to spot. Only *peutli* in the *bicarinatum*-group shares the colour pattern of *cristatum* among the smaller native African species but here the postpetiole lacks a rugoreticulum dorsally and the basigastral costulae are very reduced or absent. A similar colour-scheme is present in *bicarinatum* but here the mandibles are sculptured with dense fine striae whereas they are smooth in *cristatum* and its immediate allies. The closest relatives of *cristatum* are discussed under *gazense*, below.

MATERIAL EXAMINED

Sudan: Imatong Mts (*N. A. Weber*); Azza Forest (*Myers*). **Uganda**: Buwalasi Forest (*J. C. Bradley*). **Guinea**: Mt Nimba, Thio (*Lamotte*). **Ivory Coast**: Sipilou (*J. Levieux*). **Ghana**: Legon (*D. Leston*). **Zaire**: Lubefu (*E. S. Ross & R. E. Leech*).

Tetramorium emeryi Mayr

(Fig. 51)

Tetramorium emeryi Mayr, 1901*b*: 23. Syntype workers, female, males, SOUTH AFRICA: Port Elizabeth (*H. Brauns*) (NM, Vienna) [examined].

Tetramorium emeryi st. *cristulatum* Forel, 1913*c*: 218. Syntype workers, males, SOUTH AFRICA: Cape, Willowmore (*H. Brauns*) (MHN, Geneva) [examined]. **Syn. n.**

WORKER. TL 4·5–5·0, HL 1·06–1·12, HW 0·92–0·98, CI 85–89, SL 0·62–0·67, SI 65–70, PW 0·66–0·70, AL 1·20–1·26 (10 measured).

Mandibles smooth and shining, unsculptured except for scattered hair-pits. Anterior clypeal margin with a distinct median notch or impression. Median portion of clypeus without the three strong longitudinal carinae usually seen in this group, instead with a varying series of fine rugulae. Lateral margination of median portion of clypeus conspicuous, running anteriorly to the clypeal margin and posteriorly to the frontal carinal lobes. Frontal carinae strongly developed, running back to a point about midway between the posterior margins of the eyes and the occiput and curving outwards slightly before blending into the remaining cephalic sculpture. Eyes large, maximum diameter 0·27–0·30, about 0·29–0·32 × HW. Alitrunk in profile feebly depressed at site of metanotal groove. Propodeum armed only with a pair of minute teeth or tubercles which are much smaller than the upcurved and broadly triangular metapleural lobes. Petiole in profile rounded-nodiform, without sharply developed anterodorsal or posterodorsal angles, the node generally slightly narrower above than below. In dorsal view the petiole node distinctly broader than long. Dorsum of head finely longitudinally rugulose except occipitally where a weak rugoreticulum is present. At the level of the eyes with 9–12 rugulae between the frontal carinae. Dorsal alitrunk feebly rugulose, stronger on the pronotum than elsewhere and sometimes reticulate. Propodeal dorsum least strongly rugulose and the interstitial punctulation consequently more distinct here than on the rest of the alitrunk. A transverse crest present on the alitrunk at the site of the promesonotal junction. Petiole and postpetiole dorsally finely rugulose and densely finely punctulate, with a rough and matt appearance. Base of first gastral tergite with a few very weak costulae, the spaces between them shagreened or indistinctly punctulate. All dorsal surfaces of head and body with numerous erect or suberect quite strong hairs. Colour uniform dark brown.

The reduced propodeal armament immediately distinguishes *emeryi* from its relatives. The closest related species appears to be *erectum*, which shares the rounded petiole node of *emeryi*, but in *erectum* the propodeal spines are elongate and markedly elevated. The structure of the petiole node, with its rounded angles and its exaggerated width in dorsal view, marks off these two species from the remainder of the group where the node is angular and tends to be longer than broad when seen from above.

MATERIAL EXAMINED

South Africa: Willowmore (*H. Brauns*); Pt Elizabeth (*N. L. H. Krauss*).

Tetramorium erectum Emery **stat. n.**

(Fig. 47)

Tetramorium guineense var. *erectum* Emery, 1895: 37. Syntype workers, SOUTH AFRICA: Vrijburg (*E. Simon*) (MCSN, Genoa).

Tetramorium bacchus Forel, 1910*b*: 426. Syntype workers, SOUTH AFRICA: Natal (*Haviland*) (MHN, Geneva) [examined]. **Syn. n.**

WORKER. TL 4·2–5·0, HL 0·98–1·18, HW 0·83–1·06, CI 84–90, SL 0·62–0·76, SI 70–78, PW 0·64–0·79, AL 1·08–1·40 (20 measured).

Mandibles smooth and shining with scattered pits (when clean, a number of specimens examined have a waxy surface film which when dirty makes them seem shagreened). Anterior clypeal margin with a distinct median notch or impression. Median portion of clypeus usually without the three strong carinae generally present in this group, but in isolated specimens one or more may be present. In general the clypeus with a series of weak longitudinal rugulae. Lateral margination of median portion of clypeus strong, anteriorly fusing with the clypeal apron, posteriorly continuous with the lobes of the frontal carinae. Frontal carinae strong but occipitally merging with the rugoreticulum there present. Eyes of moderate size, maximum diameter 0·23–0·29, about 0·26–0·29 × HW. Propodeal spines in profile variable in length and thickness but always strongly elevated, often also upcurved along their length so that in many samples the apices of the spines are directed vertically. Metapleural lobes triangular and upcurved. Petiole in profile bluntly nodiform, with rounded or blunt antero- and posterodorsal angles. In dorsal view the node slightly broader than long and broader behind than in front. Dorsum of head longitudinally rugose to the level of the posterior margins of the eyes, behind with a conspicuous rugoreticulum present. Dorsal surfaces of alitrunk, petiole and postpetiole reticulate-rugose, often with a fairly distinctive punctulate ground-sculpture but this last by no means universal. Transverse crest of dorsal alitrunk feeble or absent at point of junction of pro- and mesonotum. Base of first gastral tergite with a few week costulae, the spaces between them shagreened or finely punctulate. All dorsal surfaces of head and body with numerous strong hairs. Colour uniform dark brown.

Amongst the African species of the *bicarinatum*-group *erectum* and *emeryi* share a petiole structure which differs from that of the remainder in that the node is quite high and short and has blunted or rounded anterodorsal and posterodorsal angles, and is broad in dorsal view. Elsewhere in the group the node tends to be longer and lower, and to have sharp or even prominent angles. Of the two species thus isolated *emeryi* is distinguished by its very short propodeal teeth and distinct transverse crest on the alitrunk, whilst *erectum* is characterized by the strangely elevated propodeal spines. In fact, this one character will quickly distinguish *erectum* from all its relatives.

I have not been able to see any type-material of *erectum* as the specimens are in Emery's collection in MCSN, Genoa, and are not generally available for study. However, from Emery's original description it would seem that *bacchus*, the name by which this species has most often been recorded, is an absolute synonym of *erectum*.

MATERIAL EXAMINED

South Africa: Natal, Pietermaritzburg (*C. Akerman*); Natal, Zululand, Mfongosi (*W. S. Jones*); Natal, Illovo (*A. Carnegie*); Cape Prov., Cape Town (*R. E. Turner*); Cape Prov., Cape Pt (*R. E. Ross & R. E. Leech*); Cape Prov., Grahamstown (*W. L. Brown*).

Tetramorium gazense Arnold **stat. n.**

Tetramorium guineense subsp. *gazensis* Arnold, 1958: 122, fig. 3. Syntype workers, RHODESIA: Melsetter, xii. 1948, 5000 ft [1520 m] (*G. Arnold*) (BMNH; NM, Bulawayo; MCZ, Cambridge) [examined].

WORKER. TL 4·1–4·9, HL 1·00–1·20, HW 0·86–1·04, CI 85–87, SL 0·66–0·76, SI 71–76, PW 0·60–0·74, AL 1·14–1·30 (10 measured).

Mandibles smooth and shining with scattered pits. Anterior clypeal margin with a distinct median notch or impression. Clypeus with three major longitudinal carinae, also commonly with one or more extra, more feeble rugulae. Sides of median portion of clypeus strongly marginate, the raised rim forming the margin running into the clypeal apron anteriorly and continuous with the frontal carinae posteriorly. Frontal carinae strong, extending back almost to the occipital margin where they merge with the rugoreticulum. Eyes of moderate size, maximum diameter 0·24–0·28, about 0·25–0·28 × HW. Propodeal spines long and usually stout, acute apically and upcurved along their length. Metapleural lobes elongate-triangular, often spiniform apically, upcurved. Petiole with the node roughly rectangular, the anterior face vertical or very feebly concave, the dorsum shallowly convex and the posterior face slightly concave. The antero- and posterodorsal angles either both making roughly a right-angle where they meet the dorsum or the anterior angle somewhat blunter than the posterior. In dorsal view the nodes slightly longer than broad, sometimes about as broad as long but always broader behind than in front. Dorsum of head longitudinally rugose to level of posterior margins of eyes, behind which the head has a coarse rugoreticulum. Dorsal alitrunk strongly reticulate-rugose; in some individuals this may be weaker on the mesonotum. Alitrunk with a transverse crest at the promesonotal junction. Dorsal surfaces of both petiole and postpetiole coarsely reticulate-rugulose. Base of first tergite with fine dense costulation. All dorsal surfaces of head and body with numerous strong erect or suberect hairs. Colour uniform dark brown, sometimes blackish brown.

Of the five large species of this group which occur in the Ethiopian region two, *emeryi* and *erectum*, are characterized by the shape of the petiole node and are easily separated (see above under *emeryi, erectum*). The remaining three form a very close triad of species which are separated by their colour or colour pattern. These are *cristatum, gazense* and *notiale*. Now in general it is not good procedure in ant taxonomy to place too much reliance on colour pattern, and this generalization is adhered to elsewhere in this study where intermediate colour-forms or patterns are known which grade into one another in various species or groups in the genus. However, in the case of these three species the colours appear to be discrete, there are no known intermediates, and the colours seem very stable over the extensive ranges of the species involved. Although it remains a truism that colour is to be treated with caution in the genus *Tetramorium*, it seems as if the species of the *bicarinatum*-group have developed very stable colour-patterns, as is witnessed in *bicarinatum* itself and in *insolens* (see Bolton, 1977; 1979) and other members of the group from outside the Ethiopian region. In view of this I am treating these three names as distinct species, at least until intermediates can be found to refute the decision. Thus, of the three *gazense* is uniform dark brown or blackish brown; *notiale* is uniform bright orange-brown or yellow-brown, usually with the gaster lighter than the head and alitrunk; *cristatum* is bright orange-yellow to bright orange-brown with the gaster always much darker, very dark brown or blackish brown.

MATERIAL EXAMINED

Tanzania: Mbeya (*R. M. C. Williams*). **Zaire**: Elisabethville (*E. S. Ross & R. E. Leech*); Katanga, Biano (*A. Mackie*).

Tetramorium notiale nom. n.

(Fig. 46)

Tetramorium guineense race *striatum* Arnold, 1917: 308 (attributed to Stitz). LECTOTYPE worker, RHODESIA: Bulawayo, 31.iii.1912, at roots of grass, etc. (*G. Arnold*) (BMNH), here designated [examined]. [Junior primary homonym of *Tetramorium striatum* F. Smith, 1876: 481 [= *Huberia striata* (F. Smith)].]

WORKER. TL 3·5–5·0, HL 0·82–1·14, HW 0·70–0·98, CI 83–88, SL 0·52–0·70, SI 71–79, PW 0·55–0·70, AL 0·94–1·30 (25 measured).

Mandibles smooth and shining with scattered pits. Anterior clypeal margin with a distinct median notch or impression. Median portion of clypeus with three strong longitudinal carinae, sometimes also with one or more rugulae present, but these are not as strongly developed. Lateral margination of median portion of clypeus running to the clypeal apron anteriorly, confluent with the frontal carinal lobes posteriorly. Frontal carinae long, reaching back almost to occiput where they merge with the occipital rugoreticulum. Eyes with maximum diameter 0·20–0·28, about 0·28–0·30 × HW. Propodeal spines long, strong and acute, often straight but commonly upcurved slightly along their length. Metapleural lobes elongate-triangular, usually upcurved, acute and sometimes short-spiniform apically. Petiole in profile with the node roughly rectangular, the anterior face vertical or very feebly concave, the dorsum shallowly convex and the posterior face usually slightly concave, although individuals in which this face is vertical are fairly common. The anterodorsal and posterodorsal angles of the node either both making roughly a right-angle where they meet the dorsum or the anterior angle somewhat blunter than the posterior. In dorsal view the petiole node usually slightly longer than broad, less commonly about as long as broad but always broader behind than in front. Dorsum of head usually longitudinally rugose to level of eyes but some samples with a number of cross-meshes in this area. Occipital region strongly reticulate-rugose. Dorsal alitrunk reticulate-rugose and with a transverse crest at the site of the promesonotal junction. Petiole and postpetiole both strongly reticulate-rugose. Base of first gastral tergite finely and densely longitudinally costulate. All dorsal surfaces of head and body with numerous long, quite strong hairs. Colour uniform bright yellow-brown or bright orange-brown, usually with the gaster lighter in shade than the head and alitrunk.

As discussed under *gazense, notiale* is a member of a triad of closely related species which are separated on colour.

The species was first described by Arnold (1917) as *striatum*, but he wrongly attributed the name to Stitz, citing Stitz, 1910: 144 as the reference for the name. This reference was picked up and repeated by Wheeler (1922: 897) in his catalogue of African ants. In point of fact the name is a double error as firstly the Stitz reference is to the description of *cristatum* (the name *striatum* not being mentioned), and secondly the name *striatum* is preoccupied in *Tetramorium* by a Smith name dating back to 1876.

The result of this is that the original description is correctly referred to Arnold (1917), as recognized by Santschi (1924), but that the name *striatum* is a junior homonym, here replaced by the name *notiale*. The lectotype has been selected from a series bearing the data given by Arnold in the description.

MATERIAL EXAMINED

Rhodesia: 2 workers, same data as lectotype; 3 workers, same data but 3.xi.1912; 10 workers, same data but 1.xii.1912; 4 workers, same data but 26.xi.1912; 1 worker, same data but xi.1912 (all paralectotypes of *Tetramorium guineense* race *striatum* Arnold). (BMNH; MCZ, Cambridge; NM, Bulawayo; AM, Grahamstown.)

Zaire: Lubudi (*E. S. Ross & R. E. Leech*). **Malawi**: Mjakwa (*E. S. Ross & R. E. Leech*); Blantyre. (*N. L. H. Krauss*). **Botswana**: Okavango Delta, Maxwee (*A. Russell-Smith*). **Rhodesia**: Gwebi (*K. J. Wilson*); Gwanda (*E. S. Ross & R. E. Leech*); Umtali (*G. Arnold*); Cawston Farm (*G. Arnold*); Umgusa, Cawston Block (*G. Arnold*). **South Africa**: Natal, no loc. (*Haviland*); Natal, Durban (*C. B. Cooper*).

Tetramorium peutli Forel **stat. n.**

(Fig. 48)

Tetramorium guineense st. *peutli* Forel, 1916: 419. Syntype workers, female, ZAIRE: Miss. St. Gabriel (*Kohl*) (MHN, Geneva; MRAC, Tervuren) [examined].

WORKER. TL 2·9–3·5, HL 0·72–0·80, HW 0·58–0·68, CI 78–84, SL 0·48–0·54, SI 79–86, PW 0·44–0·54, AL 0·82–0·98 (13 measured).

Mandibles smooth and shining, with scattered minute pits. Anterior clypeal margin with a marked median notch or impression, the anterior quarter of the median portion of the clypeus shallowly transversely concave. Median clypeus with three strongly developed longitudinal carinae, the lateral margination feeble and sinuate. Frontal carinae strong, extending back almost to the occipital margin, merging with the cephalic sculpture posteriorly. Maximum diameter of eyes 0·16–0·19, about 0·27–0·31 × HW. Propodeal spines in profile long and stout, acute apically and commonly slightly upcurved along their length or feebly upturned apically. In some samples the spines are more or less straight. Metapleural lobes elongate-triangular and upcurved. Petiole node in profile long and low, the posterior face usually slightly longer than the anterior so that the shallowly convex dorsum tends to slope upwards posteriorly. Anterodorsal angle of node blunt or rounded, the posterodorsal angle blunt or narrowly rounded but more strongly developed than the anterodorsal and overhanging the posterior face which is shallowly concave or which slopes anteriorly below the angle. In dorsal view the petiole node longer than broad. Dorsum of head to approximately the level of the posterior margins of the eyes with five strong longitudinal rugae between the frontal carinae. In general cross-meshes are absent but occasionally a few may be developed as far forwards as the anterior margins of the eyes. Occiput with a strong rugoreticulum approximately from the level of the posterior margins of the eyes to the margin. Dorsal alitrunk with a wide-meshed rugoreticulum, strongest on the pronotum and with a tendency to be weakened or partially effaced on the mesonotum. A transverse crest present on the dorsum at the site of the promesonotal junction; usually distinct but reduced in some individuals. Dorsum of petiole rugulose, the postpetiole dorsum unsculptured or at most with 2–3 very feeble longitudinal rugulae which are much less strongly developed than those on the petiole dorsum. Basigastral costulae absent or at most indicated by sparse, very feeble marks. All dorsal surfaces of head and body with numerous erect or suberect strong hairs. Head, alitrunk and pedicel segments bright orange or orange-brown, the gaster much darker, blackish brown or black.

Among the small species of the group *peutli* is distinguished by its reduced or absent postpetiolar sculpture, lack or near lack of basal costulae on the first gastral tergite, and its strongly contrasting colour pattern. Of the other small species *amentete* is black and coarsely sculptured everywhere, *phasias* is uniformly pale yellow, again with coarse sculpture everywhere, and *pullulum* is black with very reduced sculpture so that it is to a large extent smooth. In *amentete* basigastral costulae are conspicuous, but in *phasias* and *pullulum* they are often reduced or replaced by punctation which is, however, well defined and easily visible. The colour pattern of *peutli* is also found in *cristatum* but this is a much larger species with a strongly sculptured postpetiole, differently shaped petiole node and strong basigastral costulae.

MATERIAL EXAMINED

Ivory Coast: Banco Forest, nr Abidjan (*W. L. Brown*); Tai Forest (*T. Diomande*). **Ghana**: Mt Atewa (*B. Bolton*); Kukurantumi (*D. Leston*); Sajimasi (*D. Leston*); Numia (*D. Leston*). **Gabon**: Makokou (*I. Lieberburg*). **Zaire**: Yangambi (*N. L. H. Krauss*); Epulu (*J. C. Bradley*). **Angola**: R. Kahingo, gallery for. (*Mwaoka*).

Tetramorium phasias Forel **stat. n.**

Tetramorium guineense var. *phasias* Forel, 1914: 226. Syntype workers, SOUTH AFRICA: Natal, Durban, 20.vi.1914 (*C. B. Cooper*) (BMNH; MHN, Geneva; NM, Bulawayo) [examined].

Tetramorium guinense [sic] st. *hertigi* Santschi, 1937*a*: 234. Holotype worker, ANGOLA: Ebanga, no. 117, xi–xii (*A. Monard*) (NM, Basle) [examined]. **Syn. n.**

WORKER. TL 2·9–3·6, HL 0·70–0·86, HW 0·56–0·70, CI 78–81, SL 0·44–0·58, SI 76–83, PW 0·42–0·54, AL 0·80–0·98 (15 measured).

Mandibles smooth and shining with scattered pits. Anterior clypeal margin with a distinct impression or notch medially and the portion of the clypeus immediately behind the notch shallowly transversely concave. Median portion of clypeus with three longitudinal carinae, its lateral marginations narrow and sinuate. Frontal carinae strong, reaching back almost to the occipital margin where they merge with the rugoreticular sculpture. Eyes with maximum diameter 0·15–0·20, about 0·27–0·30 × HW. Propodeal spines long and quite stout, acute apically, straight or feebly upcurved along their length. Petiole node in profile with the anterior face more or less vertical, meeting the shallowly convex dorsal surface roughly in a right-angle. Posterodorsal angle more sharply defined than anterodorsal and tending to overhang the posterior face slightly. In dorsal view the petiole node slightly longer than broad. Dorsum of head with five major longitudinal rugae which run approximately to the level of the posterior margins of the eyes, but most individuals tend to have a few cross-meshes or weaker, short, meandering rugulae in front of this level. Occipital region of head with a strong rugoreticulum. Dorsal alitrunk reticulate-rugose, the reticulation often weaker on the mesonotum than on the pronotum. Alitrunk with a weak transverse crest at the promesonotal junction, very reduced in some specimens. Dorsal surfaces of both petiole and postpetiole reticulate-rugulose. First gastral tergite with fine, poorly defined, often faint basal costulae. All dorsal surfaces of head and body with numerous erect or suberect strong hairs. Colour uniform pale yellow to light brownish yellow.

This small species is separated from its close relatives within the group by its uniform pale colour and strong sculpture.

MATERIAL EXAMINED

Angola: Vila Folgares (*E. S. Ross & K. Lorenzen*). **Malawi**: Mkawazi Hill Forest (*E. S. Ross & R. E. Leech*). **Zaire**: 25 miles N. N'gaba (*E. S. Ross & R. E. Leech*).

Tetramorium pullulum Santschi **stat. n.**

Tetramorium guineense st. *pullulum* Santschi, 1924: 211, fig. 9*b*. Holotype worker, ZAIRE: Haut Uelé, Moto, 1920 (*L. Burgeon*) (MRAC, Tervuren) [examined].

Xiphomyrmex uelensis Santschi, 1935: 267. Holotype worker, ZAIRE: Haut Uelé, Moto, 1920 (*L. Burgeon*) (MRAC, Tervuren) [examined]. **Syn. n.**

Tetramorium fernandensis Menozzi, 1942: 174, fig 2A. Syntype workers, FERNANDO PO IS.: Moka, 1–15.xii.1939 (*H. Eidmann*) (syntypes lost, not in IE, Bologna). [Also described as new from same specimens by Menozzi, 1944: 454.] **Syn. n.**

WORKER. TL 3·2–4·0, HL 0·76–0·94, HW 0·63–0·80, CI 81–86, SL 0·52–0·64, SI 79–85, PW 0·46–0·60, AL 0·88–1·12 (10 measured).

Mandibles unsculptured, smooth and shining with scattered minute pits. Anterior clypeal margin with a distinct median notch or impression, the portion of the clypeus immediately posterior to the notch gently transversely concave. Median portion of clypeus with three strong longitudinal carinae, the lateral marginations low and sinuate, usually no more strongly developed than the carinae. Frontal carinae long and strongly developed, reaching back almost to the occipital margin where they merge with the rugoreticular sculpture. Eyes of moderate size, maximum diameter 0·16–0·18, about 0·24–0·27 × HW. Propodeal spines in profile stout, acute apically, rarely more or less straight, more commonly slightly upcurved along their length or with the extreme apices turned upwards. Metapleural lobes elongate-triangular. With the petiole in profile the posterior face longer than the anterior so that the shallowly convex dorsum is higher behind than in front. Anterior face vertical or nearly so, meeting the convex dorsum in a blunted or indistinctly rounded angle. Dorsum meeting posterior face in a narrowly rounded, prominent angle which projects and overhangs the shallowly concave posterior face. In dorsal view the petiole node usually longer than broad, less commonly about as broad as long. Dorsum of head to the level of the eyes with 5 longitudinal rugae, sometimes these continuing without interruption to the level of the posterior margins of the eyes but often with weaker longitudinal rugulae or cross-meshes appearing in this area. Occipitally the head with a weak reticulum or series of anastomoses, but without the strong rugoreticulum predominant in the group. Dorsal alitrunk with a transverse crest at the site of the promesonotal junction. Pronotum usually with a series of weak longitudinal rugulae running from the anterior margin to the crest. These are widely spaced and may be feeble in some specimens. Mesonotum behind the crest with similar sculpture to pronotum or with the sculpture variously reduced until the surface is almost smooth. Propodeal dorsum usually (but not always) retaining traces of fine rugosity. Petiole and postpetiole unsculptured dorsally or the former with faint rugular vestiges. Basigastral costulae as such absent from the first tergite but at least the basal third and sometimes the whole of the sclerite with dense fine punctulation, many of the constituents of which are roughly aligned and reproduce a costulate effect. All dorsal surfaces of head and body with numerous strong hairs. Colour uniform blackish brown or black.

The shape of the petiole node allies *pullulum* most clearly to *amentete* and *peutli* which have the segment similarly constructed. However, in *amentete* the petiole and postpetiole are both coarsely sculptured and the first gastral tergite has sharply defined basal costulae. The colour pattern of *peutli* will quickly separate it from *pullulum* as the former is orange or orange-brown with the gaster much darker, whilst the latter is uniform blackish brown or black. Besides this the petiole dorsum in *peutli* is rugulose whereas it is usually unsculptured in *pullulum*.

MATERIAL EXAMINED

Sudan: Imatong Mts (*N. A. Weber*). **Uganda**: Budongo Forest (*F. W. Edwards*); Entebbe (*J. C. Bradley*). **Zaire**: Mt Ruwenzori, Mwenda (*J. C. Bradley*); Beni Ituri For., Oicha (*J. C. Bradley*). **Angola**: Dundo, Carrisso Park (*L. de Carvalho*).

The *setigerum*-group

(Figs 52–66)

Antennae with twelve segments. Sting appendage usually dentate or pennant-shaped but sometimes elongate and roughly spatulate (*youngi*). Mandibles longitudinally striate except in *agile*. Anterior clypeal margin entire, without trace of a median notch or impression. Antennal scapes relatively long, SI always > 100. Frontal carinae variably developed; strong and almost reaching occipital margin in *setigerum*-complex, weak but of similar extent in *youngi*-complex, weak and ending at or just behind level of eyes in *doriae*- and *perlongum*-complexes. In all the frontal carinae tend to be rather close together, their maximum separation (usually at eye-level) rarely exceeding 0·50 × HW. Propodeal spines moderate to long, usually longer than the metapleural lobes (shorter in some samples of *avium*). Petiole nodiform, with a long anterior peduncle. All dorsal surfaces of head and body with numerous standing hairs which are commonly quite stout and blunted apically. Tibiae of middle and hind legs only with short, fine pubescence which is subdecumbent to appressed; never with hairs nor with erect pubescence.

The 13 members of this group are predominantly species of southern and eastern Africa, ranging up the eastern side of the continent to Ethiopia and also occurring in Arabia. A couple of species are known from Angola and Zaire but the group as a whole seems to be absent from the west African rain forest zone.

The group divides into four complexes of closely related species. The first of these, containing only *perlongum* and *dolichosum*, is characterized by the enormously elongated scapes which the species possess (Fig. 55), SI being greater than 150. (Throughout the remainder of the group the range of SI is 103–119.) Besides the very long scapes the two species of this complex have short frontal carinae which end at or just posterior to the level of the posterior margins of the eyes, and the carinae are very close together, their maximum separation $< 0{\cdot}40 \times \mathrm{HW}$. The propodeal spines are very long, much longer than the maximum diameter of the eye, and the metapleural lobes are low and rounded, not triangular. These two species represent the group in Angola and Zaire and are the most bizarre members of the *setigerum*-group.

Closely related to the above are the two small species of the *youngi*-complex, *youngi* and *metactum*. In these the SI range is 105–113. The frontal carinae are long, reaching back almost to the occipital margin, but they are only weakly developed. The propodeum is equipped with very long spines which are slightly downcurved along their length and which are much longer than the eye diameter. Metapleural lobes are short and triangular. The petiole node in dorsal view is longer than broad, and in profile the length of the dorsum is about equal to or slightly shorter than the tergal height. The two species in this complex are known from Kenya and Angola.

The *doriae*-complex (*doriae, gracile, praetextum*) inhabits dry or semi-desert areas and is known from South West Africa and Ethiopia; one of the species extends its range from Ethiopia into Yemen and Saudi Arabia. In these three the frontal carinae are feeble, only developed to the level of the posterior margins of the eyes and thereafter fading out or becoming confused with the sculpture (Fig. 53). SI range is 103–111. The propodeum is armed only with tiny denticles or is merely angular, without developed armament at all. The petiole node in dorsal view is longer than broad and in profile is roughly rectangular, the dorsal length usually greater than the height of the tergal portion.

The fourth and final complex is the largest, including *agile*, *avium*, *frenchi*, *laevithorax*, *parasiticum* and *setigerum*. These are predominantly species of the southern half of Africa although both *laevithorax* and *setigerum* are known to occur as far north as Sudan. Excluding *parasiticum*, known only from an inquiline female in a nest of *avium*, the remainder of the complex have strongly developed frontal carinae which almost reach the occipital margin (Fig. 56). The carinae are usually surmounted by a raised rim or flange for most or all of their length. Scapes have an SI range of 103–119. The propodeal spines are quite short, always shorter than the maximum diameter of the eye but longer than the triangular metapleural lobes except in some samples of *avium*. The petiole node is broader than long in dorsal view and quite narrow in profile, the dorsal length being less than the height of the tergal portion of the node.

Tetramorium agile Arnold

Tetramorium agile Arnold, 1960*a*: 455, figs 5, 5a. Syntype workers, RHODESIA: Woodvale, 28.xi.57 (*G. Arnold*) (NM, Bulawayo) [examined].

WORKER. TL 4·0–4·1, HL 0·92–0·94, HW 0·72–0·75, CI 76–80, SL 0·84–0·86, SI 112–119, PW 0·56–0·58, AL 1·24–1·30 (4 measured).

Mandibles smooth with scattered, quite conspicuous, pits. Anterior clypeal margin entire, without a median impression or notch. Frontal carinae long and strong, reaching back almost to the occipital margin where they merge into the occipital-area rugoreticulum. The frontal carinae are surmounted by a distinct raised rim or flange and are slightly convex with respect to one another, their maximum separation is at the level of the eyes, where they are about $0{\cdot}47$–$0{\cdot}48 \times \mathrm{HW}$ apart, behind this they are weakly convergent. Antennal scrobes narrow and shallow but fairly conspicuous. Antennal scapes relatively long, $\mathrm{SI} > 100$. Maximum diameter of eye 0·22–0·24, about $0{\cdot}30$–$0{\cdot}32 \times \mathrm{HW}$. With the alitrunk in profile the metanotal groove usually broadly but shallowly impressed; feebly so in some individuals. Propodeal spines straight, stout and strongly elevated; the spines quite short, distinctly longer than the low triangular metapleural lobes but shorter than the maximum diameter of the eye. Node of petiole in profile with the dorsal length slightly shorter than the height of the tergal portion. Anterodorsal angle approximately right-angular, the dorsum behind it feebly convex and sloping downwards slightly to the rather more bluntly rounded posterodorsal angle. In dorsal view the petiole node broader than long, broader behind than in front and with the anterior face more strongly arched than the posterior. Dorsum of head with 5–7 fine longitudinal rugulae between the frontal carinae at eye-level. These are quite widely spaced and have scattered cross-meshes on the dorsum behind the level of the eyes. Occipital area with a fine rugoreticulum. Dorsal alitrunk irregularly rugose, the rugae more strongly developed and more widely spaced on the pronotum than elsewhere, and with a tendency for a longitudinal component to be more obvious on the pronotum. Dorsal surfaces of petiole and postpetiole with fine rugulae superimposed on a fine punctulate ground-sculpture. Base of first gastral tergite with fine punctulation or shagreening, faint in some individuals. All dorsal surfaces with numerous strong hairs but the scapes and middle and hind tibiae only with fine decumbent to appressed pubescence. Colour medium to dark brown, the gaster darker in shade than the head and alitrunk.

T. agile is very distinct in the *setigerum*-group as it is the only species known in which the mandibles lack longitudinal striation.

MATERIAL EXAMINED

Rhodesia: Umgusa R., Sawmills (*G. Arnold*).

Tetramorium avium sp. n.

(Figs 58, 63, 64)

HOLOTYPE WORKER. TL 3·4, HL 0·75, HW 0·64, CI 85, SL 0·70, SI 109, PW 0·49, AL 0·95.

Mandibles longitudinally striate. Anterior clypeal margin entire, without a median notch or impression. Frontal carinae long, reaching back almost to the occipital margin and surmounted by a low rim or crest so that the carinae are more strongly developed than the remaining cephalic sculpture. Maximum separation of carinae about 0·50 × HW. Antennal scrobes vestigial, very shallow. Antennal scapes relatively long, SI > 100. Maximum diameter of eye 0·18, about 0·28 × HW. Alitrunk in profile with the metanotal groove feebly impressed. Propodeal spines relatively short, acute apically, longer than the metapleural lobes but shorter than the maximum diameter of the eye. Metapleural lobes triangular. Petiole in profile with a long anterior peduncle and a high, quite narrow node, the dorsal length of which is distinctly less than the height of the tergal portion. Anterior and posterior faces of the node in profile distinctly convergent dorsally, both the antero- and posterodorsal angles blunt, the latter more broadly rounded than the former. Petiole in dorsal view distinctly broader than long. Dorsum of head irregularly longitudinally rugulose, without a rugoreticulum occipitally although one or two weak cross-meshes or anastomoses are present. Ground-sculpture of head granulate or finely punctulate, weakly developed. Dorsal alitrunk finely reticulate-punctulate, the pronotum with a few feeble, superimposed irregular rugulae which tend to fade out on the mesonotum but which are again visible in the vicinity of the metanotal groove. Dorsal petiole and postpetiole predominantly finely reticulate-punctulate but with a few very weak fine rugulae. Base of first gastral tergite smooth and highly polished. All dorsal surfaces of head and body with numerous strong, standing hairs. Antennal scapes and tibiae of middle and hind legs with short, fine, decumbent to appressed pubescence only. Colour mid-brown, the gaster slightly darker in shade than the head or alitrunk.

PARATYPE WORKERS. TL 3·1–3·7, HL 0·70–0·78, HW 0·60–0·67, CI 82–86, SL 0·64–0·70, SI 103–109, PW 0·44–0·50, AL 0·82–0·96 (29 measured).

Maximum diameter of eye 0·16–0·18, about 0·25–0·28 × HW. Variation in the paratypes is predominantly in colour, which varies from mid-brown to blackish brown, and in the propodeal spine length. In most material the spines are as in the holotype but in some workers they are smaller, only about the same length as the metapleural lobes or even slightly shorter. (In one non-paratypic series the spines are reduced to teeth which are distinctly shorter than the metapleural lobes.) As the cephalic rugulae between the frontal carinae are irregular and usually broken or interrupted it is difficult to assess the number of them, but there are generally 7–10 at the level of the midlength of the eyes.

Holotype worker, **South Africa**: Cape Prov., Seaview, Port Elisabeth, 2.iii.1969, hillscrub, no. M325 (*W. L. Brown*) (MCZ, Cambridge).

Paratypes. **South Africa**: 14 workers with same data as holotype; 14 workers and 1 female, Cape Prov., Grahamstown, Fern Kloof, 19.ii.1969, no. M87, rotten wood, damp kloof (*W. L. Brown*); 1 worker, Grahamstown, iv.1915 (*J. Hewitt*). (MCZ, Cambridge; BMNH; AM, Grahamstown; NM, Basle.)

Non-paratypic material examined. **South Africa**: Cape Prov., Grahamstown, several series (*W. L. Brown*); Cape Prov., Alexandria Forest Reserve (*W. L. Brown*); Natal, Gillitts (*W. L. Brown*); Natal, Pietermaritzburg, Town Bush (*W. L. Brown*); Natal, nr Pietermaritzburg (*H. Kirby*).

This species and *frenchi* form a close species-pair within the *setigerum*-complex of this group. The two are best separated on the structure of the petiole which in *avium* conspicuously narrows from base to apex in profile, and has both the antero- and posterodorsal angles rounded (Fig. 58). In *frenchi* on the other hand the node is scarcely or not narrowed from base to apex and the angles are sharply defined, especially the anterodorsal which is a sharp right-angle, often projecting as a low crest or peak (Fig. 60). Beside this *frenchi* has a narrow band of punctulation or shagreening on the base of the first gastral tergite, although it may be faint in some individuals, and also has the alitrunk sculpture stronger, with distinct, quite coarse rugulae on the pronotum.

T. avium is the host-species of the inquiline *T. parasiticum*, described below from a single female found in a nest of *avium*. A comparison of the female of *avium* with this parasitic species is given under *parasiticum*.

Tetramorium dolichosum sp. n.

HOLOTYPE WORKER. TL 4·6, HL 1·06, HW 0·79, CI 75, SL 1·22, SI 154, PW 0·60, AL 1·26.

Mandibles longitudinally striate. Anterior clypeal margin entire, without a median impression. Median clypeal carina running the length of the clypeus. Frontal carinae short, running back to a level just behind the posterior margins of the eyes. The carinae strongly developed throughout their length, close together (their maximum separation only about 0·38 × HW), terminating abruptly in a strong, rugoreticulum. Antennal scapes very long, SI > 150; antennal scrobes absent. Maximum diameter of eye 0·22, about 0·28 × HW. In full-face view the occipital margin evenly concave, bordered by a raised rim or flange; head elongate and narrow, CI above. Masticatory margin of mandible armed with three teeth followed by a series of 6 denticles. With the alitrunk in profile the promesonotum evenly convex, sloping posteriorly to a weakly impressed metanotal groove. Propodeal dorsum approximately flat but with a very low tumulus just posterior to the metanotal groove. Propodeal spines elongate, narrow and acute. Metapleural lobes low and rounded. Petiole in profile with a long peduncle, the node with rounded antero- and posterodorsal angles and a gently convex dorsum. Postpetiole evenly convex. Dorsum of head coarsely and densely reticulate-punctate and with conspicuous rugular sculpture which forms a strong reticulum behind the level of the eyes. Dorsum and sides of alitrunk reticulate-punctate, the former also with disorganized but strong rugulae. Petiole, postpetiole and base of first gastral segment finely and densely reticulate-punctulate. All dorsal surfaces of head and body with numerous strong hairs which are blunt apically. Appendages without such hairs, only with fine appressed pubescence. Colour uniform dark brown.

PARATYPE WORKERS. TL 4·3–4·7, HL 1·04–1·08, HW 0·77–0·81, CI 74–75, SL 1·22–1·31, SI 158–162, PW 0·56–0·60, AL 1·22–1·30 (2 measured). Maximum diameter of eye 0·22–0·24, about 0·28–0·30 × HW. As holotype but one paratype having 3 teeth plus 7 denticles on the mandible as opposed to 3 + 6 in holotype and the other paratype.

Holotype worker, **Zaire** ('B. Congo' on data label): 14 miles [23 km] NW. of Mutshatsha, 30.i.1958, 1200 m (*E. S. Ross & R. E. Leech*) (CAS, San Francisco).

Paratypes. Two workers with same data as holotype (CAS, San Francisco; BMNH).

This slender species with very long scapes is most closely related to *perlongum*, and its separation from that species is discussed there. These two species together form a compact pair within the *setigerum*-group characterized by their narrow heads (CI 75 or less), long scapes (SI > 150), short frontal carinae and low, rounded metapleural lobes.

Tetramorium doriae Emery

Tetramorium doriae Emery, 1881: 530. Syntype workers, ETHIOPIA: Assab, 1880 (*G. Doria*) (MHN, Geneva) [examined].

WORKER. TL 3·2–3·8, HL 0·78–0·90, HW 0·66–0·72, CI 80–84, SL 0·69–0·80, SI 105–111, PW 0·46–0·53, AL 0·92–1·08 (4 measured).

Mandibles longitudinally striate. Anterior clypeal margin entire, without a median notch or impression. Frontal carinae very weakly developed, no stronger than the remaining cephalic sculpture and rapidly fading out or merging with the sculpture behind the level of the posterior margins of the eyes. From the clypeus to the level of the eyes, where the carinae are fairly distinct, they are close together (maximum separation about 0·39–0·42 × HW), and are roughly parallel. Antennal scrobes absent: SI > 100. Eyes relatively large, their maximum diameter 0·22–0·24, about 0·31–0·33 × HW. Alitrunk in profile long and low, the metanotal groove usually faintly impressed but sometimes obscure. Propodeum unarmed, the dorsum and declivity merely meeting in an angle, or at most with a pair of minute denticles at the junction of the two surfaces. Metapleural lobes broadly and usually bluntly triangular. Node of petiole in profile with the dorsal surface as long as, or slightly longer than, the height of the tergal portion of the node. Antero- and posterodorsal angles usually blunted, the two separated by a shallowly convex dorsum. With the petiole in dorsal view the node slightly longer than broad. Dorsum of head sparsely sculptured, with 4–5 feeble rugulae between the frontal carinae beside the very weak median carina. Occipital region with a very weak, almost effaced reticulum, the meshes of which are poorly formed and inconspicuous. Spaces between sculpture on head shining, ground-sculpture vestigial or absent. Pronotal dorsum irregularly rugulose, at least the anterior portion with a partial or complete rugoreticulum. Scattered fine rugulae present elsewhere on dorsal alitrunk and also present on dorsal surfaces of petiole and postpetiole, where they have a tendency to be predominantly longitudinal. Base of first gastral tergite smooth and shining. All dorsal surfaces of head and body with numerous standing hairs, the appendages only with fine pubescence. On the dorsal (outer) surface of the hind tibiae the pubescence is somewhat raised, subdecumbent to decumbent rather than appressed. Ventral surface of head with very long, anteriorly curved hairs present. Colour yellowish brown to mid-brown.

The three species *doriae*, *gracile* and *praetextum* form a close complex of species within the *setigerum*-group characterized by their feebly developed frontal carinae, very reduced propodeal armament and long petiole nodes. The South West African *praetextum* is easily distinguished from the other two as it lacks projecting hairs on the sides of the head behind the eyes, and has the first gastral tergite faintly punctulate or shagreened basally. Beside this the eyes of *praetextum* are relatively smaller than in *doriae* or *gracile*, being only 0·24–0·25 × HW, as opposed to a range of 0·29–0·33 × HW in the other two species.

T. doriae and *gracile* are a very closely related species-pair which may eventually prove to be just expressions of a single variable species. The former is known from Ethiopia and the Arabian peninsula, the latter only from southern Ethiopia. The two are separated on details of sculpture, as in *doriae* the pronotum has a partial or complete rugoreticulum whilst in *gracile* the promesonotom is predominantly unsculptured, with only faint traces of rugulae.

MATERIAL EXAMINED

Yemen: Tes. I. (*R. Manzoni*). **Arabia**: no loc. (*T. Morrison-Scott*).

Tetramorium frenchi Forel

(Fig. 60)

Tetramorium frenchi Forel, 1914: 229. Syntype workers, SOUTH AFRICA: Natal, Durban, Krantz Kloof, 24.v.1914, no. 318 (*H. W. B. Marley*) (NM, Bulawayo; MHN, Geneva) [examined].

WORKER. TL 2·9–3·4, HL 0·68–0·80, HW 0·58–0·66, CI 81–86, SL 0·62–0·70, SI 106–116, PW 0·42–0·52, AL 0·84–1·00 (20 measured).

Mandibles longitudinally striate. Anterior clypeal margin entire, without a median notch or impression. Frontal carinae reaching back almost to occiput, strongly developed, surmounted by a narrow raised rim or crest and more strongly developed than the remaining cephalic sculpture. Antennal scrobes weakly developed and shallow. Antennal scapes relatively long, SI > 100. Maximum diameter of eye 0·16–0·18, about 0·26–0·28 × HW. Alitrunk in profile with metanotal groove feebly or not impressed. Propodeal spines short and acute, longer than the broadly triangular metapleural lobes, but not as long as the maximum diameter of the eye. Petiole in profile with a long anterior peduncle and a sharply defined node. The anterior and posterior faces very slightly or not convergent from base of node to apex and the anterodorsal angle a sharp right-angle, often projecting into a low peak or crest. Posterodorsal angle not as sharp as anterodorsal but not broadly rounded. Petiole node in dorsal view obviously much broader than long. Dorsum of head longitudinally rugulose, often with a few feeble cross-meshes behind the level of the eyes but without a rugoreticulum occipitally. Ground-sculpture of head a superficial but fairly conspicuous granulation or punctulation, much more obvious on the sides above the eyes than on the dorsum. Dorsum of alitrunk densely rugulose, forming a loose and disorganized reticulum on the pronotum and sometimes also elsewhere. Ground-sculpture between the rugulae of moderately distinct fine punctulation. Dorsal surfaces of petiole and postpetiole finely and densely rugulose with distinct fine punctulation between the rugulae. Base of first gastral tergite with a band of fine punctulation or shagreening, usually distinct but faint in a few individuals. All dorsal surfaces of head and body with numerous standing hairs which are quite stout and tend to be blunted apically. Antennal scapes and tibiae of mid and hind legs only with short, fine, decumbent to appressed pubescence. Colour uniform dark brown to blackish brown.

This small, dark species is most closely related to *avium* but is distinguished from it by the structure of the petiole, presence of gastral sculpture and stronger rugosity on the alitrunk, as discussed under *avium*. More distantly *frenchi* is related to *laevithorax* but in the latter the alitrunk is mostly or entirely unsculptured and shining.

MATERIAL EXAMINED

Rhodesia: Cashel (*G. Arnold*); Vumba Mts, nr Umatali (*W. L. Brown*); Pungwe R., Honde Valley (*W. L. Brown*). **South Africa**: Natal, Pietermaritzburg (*W. L. & D. E. Brown*).

Tetramorium gracile Forel

(Figs 53, 62)

Tetramorium gracile Forel, 1894: 81. Holotype worker, ETHIOPIA ("Südabessinien') (*Ilg*) (MHN, Geneva) [examined].

WORKER. TL 3·4, HL 0·84, HW 0·71, CI 85, SL 0·78, SI 110, PW 0·50, AL 0·99.

Mandibles longitudinally striate. Anterior clypeal margin entire, the median clypeal carina a strongly raised ridge and the only sculpture traversing the clypeus. Scapes relatively long, SI > 100. Frontal carinae feeble. With the head in full-face view the carinae are strongly developed only to the level of the mid-length of the eye, behind this they quickly peter out. Eyes large, maximum diameter 0·21, about 0·29 × HW. Alitrunk in profile with metanotal groove broadly but only shallowly impressed. Propodeum armed only with a pair of minute denticles, which are little more than sharp angular projections. Metapleural lobes broadly triangular and distinctive. Petiole node in profile with the dorsal length at least equal to the height of the tergal portion, or slightly greater. Legs long and quite slender, length of hind femur 0·80. Dorsum of head with a few feeble and widely spaced rugulae, with weak anastomoses on the occiput. Spaces between the rugulae virtually unsculptured, here and there with some very feeble superficial reticulation. Promesonotal dorsum mostly unsculptured and shining, with feeble rugulae widely spaced out and the surface with only extremely faint reticulation. Petiole and postpetiole rugulose, reticulate in places. Gaster unsculptured, smooth and shining. All dorsal surfaces of head and body with elongate, quite stout hairs but the antennal scapes and the dorsal (outer) surfaces of the middle and hind tibiae only with short, fine decumbent to appressed pubescence. Ventral surface of head with a number of very long, anteriorly curved ammochaete hairs, the ventral margin of the mandibles with a complementary series of posteriorly curved long hairs. Colour uniform mid-brown, the legs and antennae yellow-brown.

Two close relatives of *gracile* are known and in this small complex of three species *gracile* is most closely related to *doriae* of Ethiopia and the Arabian peninsula. The two are separable on details of sculpture as *doriae* has a quite well-marked, partial or complete rugoreticulum on the pronotum. These two species are easily separable from *praetextum*, the only other known member of this group, as in this species the base of the first gastral tergite is sculptured and the sides of the head behind the eyes lack outstanding hairs in full-face view. Both other species have the base of the first tergite smooth and have outstanding hairs on the sides of the head behind the eyes.

Tetramorium laevithorax Emery

Tetramorium laevithorax Emery, 1895: 39. Holotype worker, SOUTH AFRICA: Pietermaritzburg (*Weitzecker*) (probably in MCSN, Genoa).

Tetramorium jeanae Weber, 1943: 371, pl. 16, fig. 29. Holotype worker, SUDAN: Imatong Mts, W. slopes, 6400 ft [1950 m], 2.viii.1939, no. 1395 (*N. A. Weber*) (MCZ, Cambridge) [examined]. **Syn. n.**

WORKER. TL 3·0–3·5, HL 0·70–0·78, HW 0·58–0·64, CI 81–84, SL 0·61–0·70, SI 103–113, PW 0·44–0·50, AL 0·84–0·96 (10 measured).

Mandibles longitudinally striate. Anterior clypeal margin entire, without median notch or impression. Median clypeal carina distinct but often failing to reach posterior margin; other sculpture vestigial or absent on clypeus. Frontal carinae strong, surmounted by a narrow, raised rim or flange and running back almost to the occipital margin. Antennal scrobes narrow and shallow, but fairly conspicuous. Antennal scapes relatively long, SI > 100. Maximum diameter of eye 0·16–0·18, about 0·27–0·29 × HW. With the alitrunk in profile the propodeal spines short but strong and acute, distinctly longer than the low, bluntly triangular metapleural lobes but not as long as the maximum diameter of the eye. Petiole in profile a high node, the dorsal length of the node less than the height of the tergal portion. Anterodorsal angle sharp, generally projecting into a low peak which in dorsal view is seen as a narrow crest or rim running along the anterior face of the node. In dorsal view the petiole node distinctly broader than long. Dorsum of head feebly sculptured, with only 3–5 weak and widely separated longitudinal rugulae between the frontal carinae at the level of the eyes. Occipital margin with a few rugular anastomoses or a weak reticulum; ground-sculpture vestigial, the head glossy. Promesonotal dorsum usually unsculptured, smooth and very shining, but quite commonly with 1–3 weak longitudinal rugulae traversing the glossy surface. Propodeal dorsum usually with sparse rugular sculpture, rarely, effaced. Dorsal surfaces of petiole and postpetiole with traces of feeble punctulate sculpture, especially the postpetiole, and this segment commonly with traces of rugular sculpture also. First gastral tergite unsculptured except for hair-pits. All dorsal surfaces of head and body with numerous strong hairs; middle and hind tibiae only with fine decumbent to appressed dense pubescence. Colour mid-brown to dark brown.

One of the few species of *Tetramorium* to have very reduced sculpture, *laevithorax* is quickly separated from its relatives by the lack of strong sculpture on the promesonotal dorsum.

MATERIAL EXAMINED

Uganda: Kampala (*N. A. Weber*). **Rhodesia**: Chirinda For. (*G. Arnold*); Cashel (*G. Arnold*). **South Africa**: Algoa Bay (*H. Brauns*).

Tetramorium metactum **sp. n.**

(Figs 54, 57)

HOLOTYPE WORKER. TL 4·0, HL 0·86, HW 0·70, CI 81, SL 0·78, SI 111, PW 0·59, AL 1·10.

Mandibles coarsely longitudinally striate. Anterior clypeal margin entire, without a median notch or impression. Median portion of clypeus with more than three longitudinal carinae or rugulae (5 in holotype, 4–5 in paratypes). Frontal carinae long, reaching back almost to occipital margin, slightly more strongly developed than other cephalic sculpture throughout their length. Antennal scrobes shallow and narrow, feebly developed. Antennal scapes with SI > 100. Maximum diameter of eye 0·20, about 0·28 × HW. Alitrunk in profile with metanotal groove impressed. Propodeal spines very long, narrow and acute apically, slightly downcurved along their length. Metapleural lobes short-triangular, blunted apically, not acute and upcurved. Petiole in profile with an elongate anterior peduncle, the antero- and posterodorsal angles of the node blunt and rounded, the latter more rounded than the former. Dorsal surface of node evenly but shallowly convex. Anterior and dorsal faces of postpetiole node confluent in a single smooth curve, rounding behind into a much more steeply sloping, almost vertical posterior face. In dorsal view the petiole node slightly longer than broad, the postpetiole about as long as broad, but much broader behind than in front. Dorsum of head with 7 (5–7 in paratypes) irregular longitudinal rugulae between the frontal carinae at the level of the eyes. Scattered cross-meshes are present between the rugulae; occipital region with a narrow rugoreticulum. Ground-sculpture of head a weak but fairly conspicuous granulation or punctulation. Dorsal alitrunk irregularly rugose but the rugae predominantly longitudinal on the pronotum. Dorsum and sides of petiole with faint rugular traces. Postpetiole smooth and shining, with the faintest vestige of punctulate sculpture low down on the sides. First gastral tergite smooth and shining. All dorsal surfaces of head and body with numerous standing hairs; the scapes and tibiae with short, fine, decumbent to appressed pubescence. Colour dark brown, the appendages yellow.

PARATYPE WORKERS. TL 3·6–4·1, HL 0·82–0·84, HW 0·66–0·69, CI 80–83, SL 0·74–0·78, SI 111–113, PW 0·52–0·57, AL 1·02–1·08 (3 measured). Maximum diameter of eye 0·19–0·20, about 0·27–0·29 × HW. As holotype except for variation noted in the description.

Holotype worker, **Kenya**: (no loc.) on orchids intercepted at New York quarantine, 1.vi.1961 (*W. L. Brown*) (MCZ, Cambridge).

Paratypes. 3 workers with same data as holotype (MCZ, Cambridge; BMNH).

Known only from this single short series intercepted at quarantine in New York, *metactum* is most closely related to *youngi* from Angola. Details of the separation of the two species are given under *youngi*.

Tetramorium parasiticum sp. n.
(Figs 65, 66)

Holotype female. TL 3·5, HL 0·72, HW 0·56, CI 78, SL 0·66, SI 118, PW 0·48, AL 1·10.

Apical tooth of mandible long and strong; mandibles smooth with scattered pits. Clypeus with anterior margin arcuate and entire, without a median notch and projecting over the basal borders of the mandibles. Median portion of clypeus more or less flat transversely in its anterior half. Longitudinally the clypeus is feebly convex between the lobes of the frontal carinae but anterior to this the clypeus passes through a curve and its anterior half is shallowly concave. Anterior half of clypeus with a strong median carina which does not reach back to the convex portion between the carinal lobes. Frontal carinae ending at level of posteriormost point of antennal foveae, without trace of antennal scrobes. Scapes long, SI > 100. Dorsum of head between eyes strongly transversely convex. Outline shape of head as in Fig. 65. Alitrunk in profile long and low, the propodeum unarmed, shaped as in Fig. 66, metapleural lobes low and rounded. In dorsal view the alitrunk long and narrow, AL about 2·3 × PW, the sides of the pronotum concave. Petiole in profile as shown in Fig. 66. Note that the ventral margin is convex and keel-like and that dorsally the dorsal and posterior faces of the node have fused into a single sloping surface. Postpetiole with a strongly projecting sternal portion. In dorsal view the petiole is long and narrow, the postpetiole much broader. Head with feeble rugular sculpture in the space between the eye and the antennal foveae and between the eye and clypeus, remainder of head unsculptured except for a number of broad, shallow and widely spaced pits from which hairs arise. Alitrunk laterally with feeble sculpture on median portion of pronotum and on propodeum, rest of sides almost completely smooth. In dorsal view the propodeum rugulose and rough, the remainder of the alitrunk smooth with scattered hair-pits. Petiole, postpetiole and gaster unsculptured. Dorsal surfaces of head, propodeum and pedicel segments with short stout hairs, many or all of which are weakly clavate apically. Pronotum hairless except for a row of short clavate hairs immediately in front of the promesonotal suture. Mesothoracic dorsum with larger, simple hairs on the mesoscutum which tend to become shorter and more strongly clavate on the scutellum. First gastral tergite with subdecumbent to decumbent simple hairs. Colour uniform blackish brown. Parasitic species in nests of *Tetramorium avium*.

Holotype female, **South Africa**: Natal, Gillitts, 35 km NW. of Durban, 500 m, 23.i.1977, native forest, rot. wood; in nest of *Tet. avium*, ser. AB 23 (*W. L. & D. E. Brown*) (MCZ, Cambridge).

This is the second parasitic species known in *Tetramorium* (the first being *microgyna* of the *sericeiventre*-group). Its host species is *T. avium*, and *parasiticum* appears to belong to the same species-group as its host. For comparative purposes the normal female of *avium* is illustrated in Figs 63, 64 and the main differences between host and parasite are immediately visible by examining the figures. Other differences between them beside outline shape, are tabulated below.

avium female	*parasiticum* female
Larger, HW 0·72, PW 0·70.	Smaller, HW 0·56, PW 0·48.
Scapes relatively short, SI 94.	Scapes relatively long, SI 118.
Alitrunk short and broad, AL about 1·7 × PW.	Alitrunk long and narrow, AL about 2·3 × PW.
Head shorter and broader, CI 88.	Head longer and narrower, CI 78.
Propodeum with a pair of spines.	Propodeum unarmed.
Frontal carinae extending beyond level of eyes.	Frontal carinae ending before level of eyes.
Head and mesoscutum with rugular sculpture.	Head and mesoscutum unsculptured except for hair-pits.
Clavate hairs absent.	Clavate hairs present.

Tetramorium perlongum Santschi
(Figs 55, 61)

Tetramorium perlongum Santschi, 1923: 248. Holotype worker, Angola: Benguela, Capelongo-Dongo (*Rohan-Chabot*) (MNHN, Paris) [examined]. [Also described as new in Santschi, 1925: 156, fig. 12, based on the same specimen.]

Worker. TL 4·8–5·4, HL 1·08–1·20, HW 0·78–0·86, CI 70–74, SL 1·38–1·50, SI 174–180, PW 0·58–0·68, AL 1·28–1·44 (20 measured).

Mandibles longitudinally striate. Anterior clypeal margin entire, without a median notch or impression. Median clypeal carina distinct on anterior half but fading out or absent posteriorly. Frontal carinae close

together, straight and more or less parallel, running back approximately to the level of the posterior margins of the eyes, behind which they are absent or indistinguishable from the other cephalic sculpture. Antennal scrobes absent. Scapes exceptionally long, SI as above. Maximum diameter of eye 0·22–0·27, about 0·29–0·32 × HW. Head in full-face view long and narrow with gently convex sides and an evenly but shallowly concave occipital margin. In profile the head with a narrow lug posteriorly, the posteroventral portion of which forms a sharp angle where it meets the ventral surface. Alitrunk in profile with the promesonotum convex and sloping posteriorly to the feebly impressed metanotal groove. Behind the metanotal groove the propodeum usually with a raised tumulus, more distinct in some workers than in others; the dorsum behind this tumulus more or less flat. Propodeal spines long, narrow and acute, with a tendency to be slightly downcurved along their length. Metapleural lobes low and rounded. Legs very long, the metathoracic (hind) leg with the femur about 1·65–1·90 at maximum. Petiole in profile with a long anterior peduncle, the node with a blunt or narrowly rounded anterodorsal angle and a feebly convex dorsum which rounds smoothly into the posterior face, the two not separated by an angle. Postpetiole evenly convex. Dorsum of head with a few weak, spaced-out, irregular rugulae, much effaced in some specimens, especially between the frontal carinae. Ground-sculpture an inconspicuous shagreening or fine punctulation. Dorsal alitrunk weakly sculptured with a few feeble rugulae, usually with extensive clear patches. Dorsal surfaces of petiole and postpetiole, and base of first gastral tergite with dense, fine granulation or punctulation, weaker in some individuals than in others. All dorsal surfaces of head and body with scattered strong hairs, the majority of which are blunt apically. Scapes and tibiae only with fine appressed pubescence. Colour dark brown.

Of the 13 species included in the *setigerum*-group *perlongum* and *dolichosum* are distinguished by their possession of exceptionally long legs and antennal scapes, the latter always with SI exceeding 150. These two species are best separated by their relative lengths of scape as SI is 154–162 in *dolichosum* and 174–180 in *perlongum*. Besides this *dolichosum* is much more strongly sculptured, the head having coarse rugular sculpture the spaces between which are coarsely reticulate-punctate. The strong puncturation is conspicuous everywhere on the body including the sides of the alitrunk and both pedicel segments. A narrow, raised flange bordering the occiput is present in both species but is much stronger in *dolichosum* and has a series of short ribs radiating forward from it on the dorsum of the head. Finally the median clypeal carina is complete in *dolichosum* and usually continuous with the median cephalic carina which runs back about the same distance as the frontal carinae. In *perlongum* the median clypeal carina is feeble or absent posteriorly and the median cephalic carina is vestigial or absent.

MATERIAL EXAMINED

Angola: Bruco (*D. Hollis*).

***Tetramorium praetextum* sp. n.**
(Fig. 52)

HOLOTYPE WORKER. TL 3·1, HL 0·78, HW 0·66, CI 85, SL 0·69, SI 105, PW 0·46, AL 0·92.

Mandibles longitudinally striate. Anterior clypeal margin entire, without a median notch or impression. Frontal carinae present but very weakly developed throughout their length, hardly more than a feebly raised line and only slightly more strongly developed than the other cephalic sculpture. Frontal carinae close together, their maximum separation about 0·42 × HW, slightly divergent posteriorly and ending approximately midway between the level of the posterior margins of the eyes and the occipital margin. Antennal scrobes absent; scapes quite long, SI > 100. Eyes moderate, their maximum diameter 0·16, about 0·24 × HW. Alitrunk in profile with the metanotal groove weakly impressed. Propodeum armed with a pair of minute denticles which are directed more or less vertically. Metapleural lobes triangular and acute apically, very obviously much larger than the propodeal denticles. Petiole in profile with a long anterior peduncle and a roughly rectangular node; the node with antero- and posterodorsal angles blunted and having the dorsal surface shallowly convex and slightly longer than the height of the tergal portion. In dorsal view the petiole node is slightly longer than broad, with evenly but shallowly convex sides so that the maximum width of the node is at the midlength. Dorsum of head with a fine, inconspicuous punctulate ground-sculpture, almost effaced in places, and with a number of widely spaced, weak, irregular longitudinal rugulae. Median portion of occipital region without a rugoreticulum but the occipital corners on each side with a weak reticulum developed. Dorsal alitrunk finely and superficially longitudinally rugulose, the rugulae feeble and the spaces between them densely finely punctulate, especially on the promesonotum. Dorsal surfaces of petiole and postpetiole with a number of extremely fine longitudinal rugulae and lightly punctulate spaces between them. Base of first gastral tergite lightly but densely punctulate or faintly shagreened. Dorsal surfaces of head and body with scattered standing hairs which are very short, the longest of those on the alitrunk (on the anterior pronotum) distinctly much shorter than the diameter of the eye. Hairs absent from the sides of the head behind the eyes. Appendages only with fine, appressed pubescence. Colour mid-brown.

PARATYPE WORKERS. TL 3·0–3·3, HL 0·78–0·82, HW 0·65–0·68, CI 82–85, SL 0·68–0·72, SI 103–106, PW 0·44–0·48, AL 0·88–0·94 (5 measured). Maximum diameter of eye 0·16–0·17, about 0·24–0·25 × HW. Paratypes as holotype but colour varying from mid to dark brown.

Holotype worker, **South West Africa**: 10 miles [16 km] S. of Okaukuejo, 14.v.1958, 1100 m (*E. S. Ross & R. E. Leech*) (CAS, San Francisco).

Paratypes. 5 workers with same data as holotype (CAS, San Francisco; BMNH; MCZ, Cambridge).

Of the 13 species presently known in the *setigerum*-group, *praetextum* and its two closest allies *doriae* and *gracile* form a small complex characterized by their feebly developed frontal carinae, weakly armed propodeum and relatively long petiole nodes. Of the three *praetextum* is isolated by its lack of outstanding hairs on the sides of the head behind the eyes, the presence of faint basigastral sculpture, the relatively small eyes (0·24–0·25 × HW in *praetextum* as opposed to 0·29–0·33 × HW in *doriae* and *gracile*), and the absence of elongate anteriorly curved hairs on the ventral surface of the head.

Tetramorium setigerum Mayr
(Figs 56, 59)

Tetramorium setigerum Mayr, 1901*b*: 22. Syntype workers, SOUTH AFRICA: Bothaville (*H. Brauns*) (NM, Vienna) [examined].

Tetramorium setigerum st. *quaerens* Forel, 1914: 226. Syntype workers, RHODESIA: Bulawayo 1.xii.1912 (*G. Arnold*) (BMNH; MCZ, Cambridge) [examined]. **Syn. n.**

Tetramorium setigerum var. *anteversa* Santschi, 1921: 121. Holotype worker, TANZANIA: Bukoba (*Viehmeyer*) (type not found, presumed lost). **Syn. n.**

WORKER. TL 3·4–4·0, HL 0·84–0·90, HW 0·68–0·72, CI 77–83, SL 0·70–0·80, SI 103–113, PW 0·50–0·56, AL 0·98–1·12 (20 measured).

Mandibles longitudinally striate. Anterior clypeal margin entire, without a median notch or impression. Frontal carinae strongly developed, running back almost to occipital margin and surmounted by a raised rim or flange. Frontal carinae roughly parallel, only feebly sinuate or somewhat convergent posteriorly, quite close together, their maximum separation being about 0·47–0·51 × HW. Antennal scrobes narrow and shallow but fairly distinct. Antennal scapes relatively long, SI > 100. Maximum diameter of eye 0·18–0·22, about 0·28–0·31 × HW. With alitrunk in profile the propodeal spines quite short, stout and straight, distinctly longer than the low, triangular metapleural lobes but shorter than the maximum diameter of the eye. In a few individuals the propodeal spine length may approach the maximum eye diameter. Petiole in profile with a high node, the length of the dorsum less than the height of the tergal portion. The anterior face nearly vertical, meeting the dorsal surface in a sharp right-angle. Behind this the dorsum slopes slightly downwards posteriorly to the blunt or rounded posterodorsal angle. In dorsal view the petiole node much broader than long, distinctly broader behind than in front. Dorsum of head irregularly and quite finely longitudinally rugulose, often with scattered cross-meshes behind the level of the eyes. Occipital area with more cross-meshes or with a weak reticulum present. Ground-sculpture of dorsal head a fine but fairly conspicuous punctulation or granulation between the rugulae. Dorsal alitrunk finely and densely rugulose, often (but not always) forming reticulations in places; the rugulose sculpture overlying a fine densely punctulate ground-sculpture. Dorsal surfaces of petiole and postpetiole finely rugulose with punctulate ground-sculpture. First gastral tergite either smooth basally or with a band of fine shagreening of variable development. All dorsal surfaces of head and body with numerous strong standing hairs but tibiae of middle and hind legs only with fine, short, decumbent to appressed pubescence. Colour uniform mid to dark brown, usually with the gaster darker in shade than the head and alitrunk.

T. setigerum is the central species of the largest complex included in this group, as discussed under the species-group heading above. The closest related species within the complex are *agile* and *laevithorax*, but the first of these has the mandibles without striate sculpture and the second has the promesonotal dorsum wholly or mostly smooth. The somewhat more distantly related *avium* and *frenchi* are smaller and more slenderly built species.

MATERIAL EXAMINED

Sudan: Kadugli Area (*C. Sweeney*). **Zaire**: Niapu (*H. O. Lang*). **Rhodesia**: Bulawayo (*G. Arnold*). **South Africa**: Natal, Durban (*G. Arnold*); Durban (*H. B. Marley*); Pietermaritzburg (*W. L. & D.. E. Brown*).

Tetramorium youngi sp. n.

HOLOTYPE WORKER. TL 3·4, HL 0·76, HW 0·64, CI 84, SL 0·67, SI 105, PW 0·50, AL 0·98.

Mandibles longitudinally striate. Anterior clypeal margin evenly convex, without median notch or impression. Clypeus with 3 longitudinal carinae only. Frontal carinae long, reaching back almost to the occipital margin but not strongly developed, only slightly stronger than the longitudinal rugae between them; maximum separation of the carinae is about 0·53 × HW. Antennal scrobes narrow and shallow, weakly developed. Scapes relatively long, SI > 100. Maximum diameter of eye 0·17, about 0·27 × HW. With the alitrunk in profile the metanotal groove impressed. Propodeal spines very long, narrow and acute apically and feebly downcurved along their length. Metapleural lobes short-triangular and acute, their apices slightly upcurved. Petiole in profile with a long anterior peduncle and short node. The anterior and posterior faces of the node slope towards one another so that the node is somewhat narrower above than below. Dorsum of node very shallowly convex and the posterodorsal angle more rounded than the anterodorsal. Postpetiole in profile with the anterior and dorsal surfaces forming a single continuous curve; the posterior face almost vertical, much steeper than the anterior. Petiole node in dorsal view slightly longer than broad, the postpetiole about as long as broad but much narrower in front than behind. Dorsum of head with 5 longitudinal rugulae between the frontal carinae, the outer members of which are broken or discontinuous. Spaces between rugulae virtually smooth, with only the faintest traces of ground-sculpture. Occipital region without a reticulum. Dorsal alitrunk unevenly rugose but the constituents widely separated by smooth spaces and predominantly longitudinal on the pronotum. Petiole, postpetiole and first gastral tergite unsculptured, smooth and shining. All dorsal surfaces of head and body with numerous standing hairs. Scapes and tibiae only with fine, short, decumbent to appressed pubescence. Head and body glossy blackish brown, the appendages pale yellow.

Holotype worker, **Angola**: Salazar, I.I.A.A., 9–15.iii.1972 (A26) (*P. M. Hammond*) (BMNH).

Within the *setigerum*-group *youngi* is most closely related to *metactum*, but is slightly smaller than that species, has shorter antennal scapes and has more weakly developed sculpture. In particular, *youngi* lacks cross-meshes on the dorsum of the head and also lacks an occipital reticulum, both of which are present in *metactum*. Also, *metactum* has traces of rugular sculpture on the sides of the petiole and coarser more dense rugosity on the dorsal alitrunk.

More distantly both *youngi* and *metactum* seem to be related to *perlongum* and *dolichosum*, but both these species are quickly separated by their exceptionally long appendages (SI > 150), more feebly developed frontal carinae and rounded metapleural lobes.

The *shilohense*-group
(Figs 67–77)

Antennae with 12 segments. Sting appendage usually triangular or pennant-shaped but may be blunted apically. Anterior clypeal margin with or without a median notch or impression, the mandibles usually sculptured if only feebly so. Frontal carinae varying from strongly developed to absent, the antennal scrobes from moderately developed to absent. Eyes small to minute, commonly with only 1–5 facets in all, but always with 5 or fewer ommatidia across the greatest diameter. Maximum diameter of eye always less than 0·17 × HW and always less than the maximum width of the antennal scape. Propodeum armed with a pair of spines or teeth. Pilosity of head and body usually of numerous fine, short hairs which are erect-suberect, very dense in one species (*intonsum*), bizarre in the *somniculosum*-complex. Dorsal (outer) surfaces of middle and hind tibiae with decumbent to appressed fine pubescence except in *intonsum*.

At first glance, taking into account the variability of the clypeal margin, frontal carinae, scrobes, pilosity etc. as noted above, this collection of species appears to be only a convenience group, linked merely by their possession of reduced or vestigial eyes. In particular the relatively large, strongly sculptured, darkly coloured forms such as *diomandei* seem far removed from the minute, depigmented smooth species like *warreni* and *typhlops*. However, when all the species of the group are placed together and compared, a morphocline becomes visible which links all the species of the group rather more closely than the examination of isolated species would imply. This morphocline runs through the four complexes of closely related species into which the group can be divided, and which are discussed in order below. In general, the line from the first complex to the last shows a reduction in pigmentation, reduction in density and intensity of sculpture, reduction in length and strength of frontal carinae until they disappear, reduction in development of antennal scrobes until they disappear, reduction in scape length, and a reduction in eye size.

The first complex contains the species *diomandei* and *somniculosum*, known from Ivory Coast and Mozambique respectively. These are brown or reddish brown, strongly sculptured species in which the frontal carinae run back almost to the occipital margin and are strongly developed, being surmounted by a strong raised rim or flange (Fig. 67). The antennal scrobes are broad and shallow but conspicuous and the eyes are of moderate size, being about 0·08–0·10 (0·10–0·13 × HW) with a relatively broad head, CI range 91–95. Other peculiarities shared by these two species include the presence of bizarre pilosity, with spatulate or scale-like flattened hairs being conspicuous on the gaster (Figs 71, 72), and the development of a very irregular outline to the dorsal alitrunk, more obvious in *diomandei* than in *somniculosum* (compare Figs. 73 and 74).

The second complex includes four species which are closely related to the above but which lack the bizarre pilosity. These are *intonsum, jugatum, shilohense* and *termitobium*, in which all body hairs are fine and erect to subdecumbent as indeed is the case throughout the remaining complexes of the group. In these four species sculpture is still pronounced and very distinct although the colour of the ants is yellow or yellowish brown. The frontal carinae are shorter and less strongly defined, without a strong flange or rim and fading out behind the eyes, not reaching the occipital region (Fig. 68). The antennal scrobes are weak or vestigial and the eyes small, with 3–5 ommatidia across the greatest diameter (maximum diameter range 0·06–0·10, about 0·11–0·15 × HW). Scapes are relatively long, SI 78–99. *T. intonsum* and *jugatum* are West African species, known from Ivory Coast, Ghana and Nigeria (the latter also occurring in Angola) whilst *termitobium* is a central African species of Gabon and Zaire, and *shilohense* represents the complex in the southern and eastern parts of the continent, being known from Malawi, Zambia and Rhodesia.

The third complex contains only the single Nigerian species *dysderke*, which combines a mixture of characters of both the *shilohense*-complex and the *subcoecum*-complex, below. In *dysderke* the sculpture is distinct and strongly developed as in *shilohense* and its allies, but the eyes consist of only a single facet and the frontal carinae are very feeble and end at the level of the eyes, characters which are present in *subcoecum* and its relatives. Besides these features, the scrobes are absent in *dysderke*, body colour is yellow and the scapes are intermediate in length between the second and fourth complexes, with SI 80.

Finally, the fourth complex, containing the species *amaurum, subcoecum, traegaordhi* and *warreni* of southern and eastern Africa, and the Ivory Coast savannah species *typhlops*. In these, colour is yellow, sculpture is very much reduced or absent (dorsal alitrunk unsculptured), the eyes are minute and consist of only 1–5 ommatidia in total. The frontal carinae are vestigial, disappearing before the level of the eyes (Fig. 69), or are completely absent (Fig. 70). The antennal scapes are relatively short (SI 68–80) and antennal scrobes are absent. Within the complex some gradation of characters can be seen. In *amaurum* frontal carinae are feeble but present, whereas they tend to vanish in smaller workers of *subcoecum* and are not at all represented in *warreni*. Eye size also decreases within the complex, with 3–5 facets being present in *amaurum*, 2 in *traegaordhi*, 1 in *subcoecum* and *warreni*. The limit of this reduction in the eye is seen in *typhlops* where it is represented not by an ommatidium but by a discoloured patch on the side of the head.

The species-group most closely related to the *shilohense*-group appears to be that of *inglebyi* from India (Bolton, 1977). The three species in the *inglebyi*-group share most of the characters noted above but have the base of the first gastral tergite modified so that it forms an anterolateral pair of horns or points, a feature not developed in the allies of *shilohense*.

***Tetramorium amaurum* sp. n.**

(Fig. 69)

HOLOTYPE WORKER. TL 2·7, HL 0·70, HW 0·63, CI 90, SL 0·46, SI 73, PW 0·42, AL 0·72.

Mandibles finely and faintly longitudinally striate, the sculpture not conspicuous. Anterior clypeal margin with a small median notch or impression. The central portion of the clypeus immediately behind the impression very shallowly transversely concave but the median carina running the length of the clypeus. Frontal carinae very feeble, no more than fine and narrow raised lines which end at the level of the eyes. Antennal scrobes absent. Eyes minute but quite conspicuous, of 3–4 poorly defined facets and much shorter than the maximum width of the scape. Maximum diameter of eye 0·05, about 0·08 × HW. Alitrunk in profile more or less evenly convex, with a very feeble and shallow impression at the metanotal groove that barely interrupts the outline. Propodeum armed with a pair of short triangular teeth which are about as long as their basal width. Metapleural lobes distinctly broader and very slightly longer than the propodeal teeth, lobate and rounded apically. Petiole in profile with the dorsal length less than the height of the tergal portion, both antero- and posterodorsal angles rounded. Petiole in dorsal view slightly broader than long and with all angles rounded, the dorsum merging into the sides, the anterior, and the posterior faces. Dorsum of head with a few feeble, scratch-like longitudinal rugulae which fade out before reaching the occipital region, which is only very lightly shagreened. Spaces between sparse rugulae on dorsum on head with a weak, superficial ground-sculpture. Dorsal surfaces of alitrunk, petiole, postpetiole and gaster unsculptured except for a few faint punctulations on the propodeum. Dorsal surfaces of head and body with sparse standing hairs but the middle and hind tibiae only with short pubescence which is decumbent to appressed. Colour yellow.

PARATYPE WORKERS. TL 2·6–3·1, HL 0·66–0·74, HW 0·60–0·66, CI 89–94, SL 0·44–0·50, SI 69–76, PW 0·38–0·46, AL 0·71–0·82 (8 measured). As holotype but eye with 3–5 facets, the limits of individual ommatidia generally difficult to see. Maximum diameter of eye 0·04–0·07, about 0·06–0·10 × HW.

Holotype worker, **Rhodesia**: Redbank, 3.xii.1917 (*G. Arnold*) (BMNH).

Paratypes, 10 workers with same data as holotype (BMNH; MCZ, Cambridge; NM, Bulawayo).

The four species closely related to *amaurum*, namely *subcoecum*, *warreni*, *traegaordhi* and *typhlops*, only have a single ommatidium or two ommatidia in the eye, whereas *amaurum* has 3–5. Beside this, *warreni* and *typhlops* are both minute species with HW < 0·50, SL < 0·35, and completely lack frontal carinae. In *subcoecum* frontal carinae are vestigial or absent but in *traegaordhi* they are about as strongly developed as in *amaurum*. Apart from the size of the eye, *traegaordhi* differs from *amaurum* by having the petiole node distinctly transverse in dorsal view, much broader than long, and by having longer, more conspicuous body pilosity than *amaurum*. To illustrate this, with the body in profile the longest hairs on both the alitrunk and the first tergite are distinctly longer than the maximum width of the hind tibia in *traegaordhi*, shorter than the hind tibial width in *amaurum*.

***Tetramorium diomandei* sp. n.**

(Figs 67, 71, 73)

HOLOTYPE WORKER. TL 3·2, HL 0·83, HW 0·78, CI 94, SL 0·56, SI 72, PW 0·52, AL 0·90.

Mandibles longitudinally striate. Anterior clypeal margin with a broad but quite shallow median impression, the portion of the clypeus behind this impression shallowly transversely concave between a pair of longitudinal carinae. The transversely concave anterior portion of the clypeus virtually unsculptured but the posterior portion rugulose between the lobes of the frontal carinae. Frontal carinae long and strongly developed, sinuate along their length, reaching back almost to the occipital margin and surmounted by a thick, coarse rim or crest. Antennal scrobes broad but shallow. Eyes very small, with four ommatidia across the greatest diameter. Maximum diameter of eye 0·08, about 0·10 × HW, less than the maximum diameter of the scape. Dorsal outline of alitrunk in profile very irregular (Fig. 73), folded into a number of prominences and depressions. Anterior portion of pronotum (just behind the cervical shield) bounded by a very strong transverse crest which runs from the anterolateral pronotal angle up the sides of the pronotum and across the dorsum. Propodeum armed with a pair of extremely stout, broad spines; the metapleuron with a pair of shorter but very broad-based triangular lobes. Petiole in profile with an elongate thick peduncle and a small, roughly rectangular node. In dorsal view the petiole node is very slightly broader than long. Dorsum of head sculptured with three very strong, coarse carinae between the frontal carinae. Spaces between the carinae with finer, blunt rugosity, the tops of the carinae and the larger rugae dull and with a finely beaded appearance due to the presence of minute dense punctulation. Dorsal alitrunk coarsely rugose, predominantly longitudinally so but with scattered transverse elements. Dorsal surfaces of petiole and postpetiole finely reticulate-rugulose, the base of the first gastral tergite finely feebly shagreened. Dorsal surfaces of head, alitrunk and pedicel segments without standing hairs of any description; with bizarre thick, minute, stud-like or scale-like hairs thinly distributed over the surfaces, most easily visible on head and postpetiole. First gastral tergite with numerous subdecumbent to decumbent flattened scale-like or leaf-like hairs. Spaces between these bizarre hairs with very sparse, minute, appressed pubescent hairs which are scarcely visible. Tibiae of middle and hind legs only with short, appressed pubescence. Colour uniform brown, the appendages lighter.

PARATYPE WORKERS. TL 3·1–3·5, HL 0·78–0·86, HW 0·74–0·80, CI 91–95, SL 0·52–0·57, SI 70–74, PW 0·48–0·56, AL 0·84–0·94 (25 measured). As holotype but maximum diameter of eye 0·08–0·10, about 0·10–0·13 × HW; with 4 or 5 ommatidia in the greatest diameter. Sculpture somewhat variable. In some specimens the dorsum of the head having 3–5 coarse carinae between the frontal carinae and the posterior half of the clypeus often with a well-defined fine median carina. Basic brown colour of the body with a dull reddish tint in some individuals.

Holotype worker, **Ivory Coast**: Tai Forest, 23.viii.1975, no. 1 (*T. Diomande*) (BMNH).
Paratypes. 42 workers with same data as holotype (BMNH; MCZ, Cambridge; NM, Basle).

The two species *diomandei* and *somniculosum* form a close pair within the *shilohense*-group, characterized by their bizarre pilosity, the highly irregular outline shape of their dorsal alitrunk, and the presence of a strongly raised transverse crest on the anterior part of the pronotum. Coupled with this they have strongly developed frontal carinae and sculpture which is generally coarser than is seen elsewhere in the group. Differences between the two species are tabulated as follows.

diomandei	*somniculosum*
Flattened hairs of first gastral tergite scale-like or leaf-like, pubescence between them minute and inconspicuous (Fig. 71).	Flattened hairs of first gastral tergite long and spatulate, pubescence between them conspicuous and as long as the flattened hairs (Fig. 72).
Dorsum of head with 3–5 longitudinal carinae between the frontal carinae.	Dorsum of head with 9–12 longitudinal carinae between the frontal carinae.
Dorsal outline of alitrunk highly irregular (Fig. 73).	Dorsal outline of alitrunk not so strongly irregular (Fig. 74).
Scapes short, SI 70–74.	Scapes longer, SI 75–81.
Petiole in dorsal view slightly broader than long.	Petiole in dorsal view longer than broad.
Raised flanges of frontal carinae thick and coarse.	Raised flanges of frontal carinae narrow and fine.
Median clypeal carina not reaching anterior clypeal margin.	Median clypeal carina usually reaching anterior clypeal margin (rarely broken or interrupted).

Tetramorium dysderke sp. n.

HOLOTYPE WORKER. TL 2·4, HL 0·59, HW 0·50, CI 85, SL 0·40, SI 80, PW 0·34, AL 0·64.

Mandibles longitudinally striate. Anterior clypeal margin entire, without notch or impression, the median carina running the length of the clypeus. Frontal carinae very short and very feebly developed, no stronger than the other cephalic sculpture, diverging from the frontal lobes and ending at the level of the eyes; inconspicuous. Antennal scrobes absent. Eyes minute, consisting of only a single ommatidium on each side, its diameter approximately 0·03, about 0·06 × HW. Propodeum armed with a pair of short triangular spines; the metapleural lobes triangular and only slightly shorter than the spines. Petiole node low and short-rectangular in profile, with a roughly right-angular anterodorsal angle and a rounded posterodorsal angle. In dorsal view the petiole node is about as long as broad. Dorsum of head finely but distinctly irregularly longitudinally rugulose, the spaces between the rugulae finely punctulate. Dorsal alitrunk with a low transverse ridge on the anterior pronotum; behind this the promesonotum finely longitudinally rugulose with punctulate interspaces. Dorsal surfaces of petiole and postpetiole unsculptured but the former with a fine transverse crest running across the anterior face. First gastral tergite unsculptured and shining. All dorsal surfaces of head and body with numerous short, fine, standing hairs. Dorsal (outer) surfaces of middle and hind tibiae only with short, fine pubescence which is decumbent or appressed. Colour uniform yellow.

Holotype worker, **Nigeria**: Gambari, 24.vii.1969, in rotten stump, C.R.I.N. Exp. Sta. (*B. Bolton*) (BMNH).

This small species is remarkable in that it occupies a position halfway between the *shilohense*-complex (*intonsum, jugatum, shilohense, termitobium*) and the *subcoecum*-complex (*amaurum, subcoecum, traegaordhi, typhlops, warreni*), its main characters being a patchwork of those predominating in the two complexes. In particular, it retains the distinct sculpture and relatively long scapes seen in *shilohense* and its allies but has the minute eyes and very short frontal carinae characteristic of the *subcoecum*-complex.

This strange combination of characters will quickly isolate *dysderke* from all other members of the group as the presence of very short frontal carinae and eyes of a single ommatidium, coupled with dense and conspicuous sculpture on the head and alitrunk and an SI of 80, is restricted to this species.

Tetramorium intonsum sp. n.

(Fig. 68)

HOLOTYPE WORKER. TL 2·9, HL 0·70, HW 0·59, CI 84, SL 0·56, SI 95, PW 0·42, AL 0·80.

Mandibles longitudinally striate. Anterior clypeal margin entire, without a notch or impression medially; median clypeal carina running from anterior margin to posterior suture. Frontal carinae moderately developed, running back beyond the level of the posterior margins of the eyes but fading out behind that level, not approaching the occipital region. Antennal scrobes vestigial, the area of the side of the head below the frontal carinae only slightly concave, evenly sculptured. Antennal scapes relatively long, SI > 90. Eyes small, with only 4 ommatidia in the greatest diameter; maximum diameter of eye 0·08, about 0·14 × HW, smaller than the maximum width of the scape. With the alitrunk in profile the propodeum armed with a pair of moderately long, stout spines. Metapleural lobes low and triangular. Petiole in profile with a stout anterior peduncle, the node with the anterodorsal angle blunt but conspicuous, almost a right-angle; posterodorsal angle represented by a short convex surface where the dorsum grades into the posterior face. In dorsal view the node very slightly longer than broad. Dorsum of head irregularly longitudinally rugulose, the occipital region and sides of the head reticulate-rugulose, all of the cephalic sculpture fine but dense. Dorsal alitrunk densely rugulose, predominantly longitudinally so but with scattered cross-meshes and reticular patches, especially visible on dorsum of pronotal shoulders. Dorsum of petiole with fine rugular sculpture but the postpetiole virtually unsculptured dorsally, only with some light shagreening. First gastral tergite unsculptured. All dorsal surfaces of head and body covered in a dense pelt of fine soft hairs. With the head in full-face view the sides between the posterior margins of the eyes and the occipital corners with abundant projecting hairs, usually too dense to be counted easily. Dorsal (outer) surfaces of hind tibiae with dense long pubescence which is suberect to subdecumbent and very conspicuous. Colour uniform yellow.

PARATYPE WORKERS. TL 2·8–3·1, HL 0·64–0·70, HW 0·54–0·59, CI 81–85, SL 0·52–0·56, SI 93–99, PW 0·38–0·50, AL 0·76–0·90 (20 measured). As holotype, with maximum diameter of eye 0·07–0·08, about 0·12–0·15 × HW and with 4–5 ommatidia in the greatest diameter. Some paratypes with roguloreticulum on occiput more sharply defined than in holotype and also with the dorsal alitrunk predominantly reticulate-rugulose. On the dorsum of the postpetiole some individuals show vestiges of rugular sculpture but in others this area is smooth. A majority of specimens have the propodeal spines either slightly downcurved or very feebly sinuate along their length; even in the holotype the spines are not absolutely straight. Degree of elevation of the standing pubescence on the dorsal (outer) surfaces of the middle and hind tibiae is variable from suberect to subdecumbent, but is always very dense and easily discernible. With the alitrunk in profile the metanotal groove is commonly weakly impressed, but this is not the case in scattered individuals in each series.

Holotype worker, **Ghana**: Tafo, 15.i.1971, rotten wood (*B. Bolton*) (BMNH).

Paratypes. 8 workers with same data as holotype; 2 workers, Tafo, 9.ii.1971, litter sample (*B. Bolton*); 6 workers, Tafo, 20.x.1970, rotten log (*B. Bolton*); 6 workers, Tafo, 10.ix.1970, rotten log (*B. Bolton*) (BMNH; MCZ, Cambridge, NM, Basle).

Non-paratypic material examined. **Ivory Coast**: Dabou Savannah, W. of Abidjan (*W. L. Brown*). **Nigeria**: Gambari (*B. Bolton*).

T. intonsum belongs to a complex of four small yellow species in this group, the other members being *jugatum, shilohense* and *termitobium*. Together they are characterized by their moderately developed frontal carinae, coarse sculpture, small (as opposed to minute) eyes with 3–5 ommatidia in the greatest diameter, and vestigial or very feeble antennal scrobes. *T. intonsum* is easily isolated from this assemblage by its possession of dense fine pilosity, suberect to subdecumbent long pubescence on the hind tibiae and relatively long antennal scapes in which SI range is 93–99 as opposed to a range of 78–93 in the other 3 species combined. The upper portion of this range is seen only in *jugatum* (SI 86–93) and specimens in which the SI matches are quickly separable on the pilosity characters, as indicated in the key.

All samples collected have originated in leaf litter or rotten wood, the majority from rotting logs. The state of the wood does not seem to matter much to this species as it has been found in dry dead wood as well as in wet-rotten stumps.

Tetramorium jugatum sp. n.

(Fig. 75)

HOLOTYPE WORKER. TL 2·5, HL 0·62, HW 0·54, CI 87, SL 0·48, SI 89, PW 0·39, AL 0·70.

Mandibles longitudinally striate. Anterior clypeal margin entire, without a notch or impression. Median carina sharp and running the length of the clypeus. Frontal carinae moderately developed and surmounted by a low rim or flange, running back beyond the level of the eyes but fading out and merging with the remaining cephalic sculpture well before approaching the occipital margin. Antennal scrobes vestigial, indicated by a very feeble concavity below the frontal carinae. Eyes small, with only 3 ommatidia in the greatest diameter, much smaller than the maximum width of the scape; maximum diameter of eye 0·07, about 0·13 × HW. With the alitrunk in profile the metanotal groove feebly impressed. Propodeal spines long and quite stout, the metapleural lobes low and triangular. Petiole in profile with a long, stout anterior peduncle and a short node, the anterodorsal angle of which is more sharply developed than the posterodorsal. In dorsal view the petiole node is very slightly broader than long. Dorsum of head irregularly longitudinally rugulose, the occipital area and the sides of the head reticulate-rugulose. Dorsal alitrunk predominantly longitudinally rugose but with numerous cross-meshes and irregularities. Petiole dorsum with faint rugulae but the postpetiole only with vestiges of sculpture present. First gastral tergite smooth. All dorsal surfaces of head and body with numerous standing hairs but these not so dense as to form a pelt. Dorsal (outer) surfaces of hind tibiae with short pubescence which is decumbent to appressed. Colour yellow but tinged with brown.

PARATYPE WORKERS. TL 2·2–2·6, HL 0·56–0·68, HW 0·48–0·60, CI 83–88, SL 0·42–0·50, SI 86–93, PW 0·32–0·42, AL 0·60–0·72 (20 measured). As holotype but eye with 3–5 ommatidia in its greatest diameter; maximum diameter of the eye 0·06–0·08, about 0·12–0·14 × HW. Sculpture in some paratypes more sharply marked than in holotype, a few with three strong rugulae between the frontal carinae which run back beyond the level of the eye. Dorsal alitrunk distinctly reticulate-rugulose in some and many having traces of rugular sculpture on the postpetiolar dorsum.

Holotype worker, **Ivory Coast**: Anyama, no. 8, Teke Forest, 1.ii.1974 (*T. Diomande*) (BMNH).

Paratypes. 20 workers with same data as holotype; 21 workers, Tai Forest, 11.iii.1976, no. 12 (*T. Diomande*); 6 workers, Tai Forest, 11.iii.1976, no. 5 (*T. Diomande*) (BMNH; MCZ, Cambridge; NM, Basle).

Non-paratypic material examined. **Ivory Coast**: several short series, Tai Forest and Teke Forest (*T. Diomande*); Palmeraie de Lame (*T. Diomande*); Banco Forest nr Abidjan (*W. L. Brown*); Nzi Noua (*W. L. & D. E. Brown*); Lamto (*J. Levieux*). **Ghana**: Mampong (*P. M. Room*); Tafo (*B. Bolton*). **Nigeria**: Ibadan (*B. Critchley*); Gambari (*B. Bolton*). **Angola**: Dundo (no name).

A small rotten-wood inhabiting species which is widely distributed in West and Central Africa, *jugatum* is closely related to *intonsum, shilohense* and *termitobium*. The characters common to these species are discussed under *intonsum*. Of these four species *intonsum* is separated by its possession of long, very dense pubescence on the middle and hind tibiae which is suberect or subdecumbent and by its dense body pilosity and elongate antennal scapes, as noted in the discussion of that species. The remaining three lack such conspicuous pilosity and in general have shorter scapes. Of the remainder, *shilohense* is separated from *jugatum* by the regular longitudinal sculpture of the dorsal alitrunk which it possesses whilst *termitobium* is characterized by its more massively constructed head, in which CI is in the range 92–94 (as opposed to 83–88 in *jugatum* and 85–90 in *shilohense*).

Tetramorium shilohense Forel **stat. n.**

Tetramorium simillimum var. *shilohense* Forel, 1913*c*: 218. Syntype workers, RHODESIA: Shiloh, 10.v.1913 (*G. Arnold*), and Bembesi, 12.i.1913 (*G. Arnold*) (BMNH; NM, Bulawayo; MCZ, Cambridge; MHN, Geneva; AM, Grahamstown) [examined].

WORKER. TL 2·4–2·8, HL 0·58–0·74, HW 0·50–0·65, CI 85–89, SL 0·42–0·52, SI 78–85, PW 0·36–0·44, AL 0·66–0·80 (20 measured).

Mandibles longitudinally striate. Anterior clypeal margin entire or at most with a very feeble, shallow median impression which is restricted to the anterior apron and does not intrude upon the body of the clypeus. Frontal carinae moderately developed, surmounted by a low raised rim or flange, reaching back beyond the level of the eyes but merging with the remaining cephalic sculpture on the occiput. Antennal scrobes broad and very shallow, reduced, represented only by a slight concavity of the side of the head below the frontal carinae. Eyes small, smaller than the maximum width of the scape, with only 3–5 ommatidia across the greatest diameter. Maximum diameter of eye 0·06–0·10, about 0·12–0·15 × HW. With the alitrunk in profile the metanotal groove usually weakly impressed, rarely absent. Propodeal spines elongate triangular, broad basally. Metapleural lobes broadly triangular. Petiole in profile with an elongate and fairly stout anterior peduncle, the node with the anterodorsal angle roughly right-angular and usually quite sharply developed; posterodorsal angle blunter and more broadly rounded, often the dorsal and posterior faces meeting in a narrow curve. Petiole in dorsal view with the node varying from slightly broader than long to slightly longer than broad, the former condition apparently predominant. Dorsum of head irregularly longitudinally rugulose, the occipital area usually with a ruguloreticulum, at least with numerous cross-meshes and anastomoses. Dorsal pronotum strongly and quite regularly longitudinally rugose, the components spaced out and usually without trace of cross-meshes although one or two may be present. Dorsal surfaces of petiole and postpetiole commonly with traces of rugular sculpture which may be very faint; in some the postpetiole merely feebly punctulate. First gastral tergite smooth and shining. All dorsal surfaces of head and body with numerous standing hairs, the tibiae of the middle and hind legs only with short decumbent to appressed pubescence. Colour uniform yellow to light brownish yellow.

T. shilohense is distinguished from its immediate allies (*intonsum, jugatum, termitobium*) by its lack of standing pubescence on the tibiae, relatively short scapes and regular longitudinal sculpture on the pronotum. The related *intonsum* is a much more densely hairy species with standing tibial pubescence and longer scapes, whilst *jugatum* and *termitobium* both lack the characteristic pronotal sculpture which defines *shilohense*. Beside this *termitobium* has a more massively constructed head with more strongly convex sides so that its CI is higher (92–94) than in *shilohense* (85–89).

MATERIAL EXAMINED

Malawi: Ekwendeni (*E. S. Ross & R. E. Leech*). **Zambia**: S. Kamarla For. Res., nr Lusaka (*M. Bingham*). **Rhodesia**: Matopos (*G. Arnold*); Gwebi (*K. Wilson*); Umtali Heights (*E. S. Ross & R. E. Leech*).

Tetramorium somniculosum Arnold

(Figs 72, 74)

Tetramorium somniculosum Arnold, 1926: 262, fig. 72. Syntype workers, females, males, MOZAMBIQUE: Amatongas Forest, 14.ii.1917 and ii.1917 (*G. Arnold*) (BMNH; NM, Bulawayo; MCZ, Cambridge; USNM, Washington) [examined].

WORKER. TL 3·1–3·4, HL 0·76–0·84, HW 0·70–0·78, CI 92–95, SL 0·54–0·62, SI 75–81, PW 0·44–0·52, AL 0·84–0·92 (8 measured).

Mandibles longitudinally striate. Anterior clypeal margin with a median impression, the central portion of the clypeus behind the impression shallowly transversely concave between a pair of longitudinal carinae. Median clypeal carina usually running the length of the clypeus, rarely interrupted or broken anteriorly. Frontal carinae long, running back almost to the occipital margin and surmounted by a narrow raised rim or flange. Antennal scrobes broad and shallow, conspicuous. Eyes small, with maximum diameter 0·08–0·10, about 0·11–0·13 × HW, smaller than the maximum width of the scape and with only 4–6 ommatidia in their greatest diameter. With the alitrunk in profile the dorsal outline irregular and the anterior pronotum with a very conspicuous raised crest which runs from the anterolateral angle of the pronotum, up the sides and across the dorsum just behind the cervical shield. Propodeal spines short and very stout indeed. Metapleural lobes massive, broadly triangular. Petiole in profile with an elongate, thick peduncle and a low rectangular node. In dorsal view the petiole node longer than broad. Dorsum of head with 9–12 longitudinal rugae between the frontal carinae at the level of the eyes, none of which are as strongly developed as the frontal carinae themselves. Occipital region of head with a rugoreticulum. Dorsal alitrunk coarsely and predominantly longitudinally rugose, but with some transverse components present. Dorsal surfaces of petiole and postpetiole finely longitudinally rugulose with a few cross-meshes or a partial reticulum on the latter in a few workers. First gastral tergite usually with a narrow shagreened strip at the extreme base but this is very feeble in some. Pilosity bizarre, the head, alitrunk and pedicel segments without standing hairs but with sparse reclinate pubescence, best seen on the postpetiole. First gastral tergite with elongate, flattened spatulate hairs which are decumbent; the spaces between these bizarre hairs occupied by sparse but conspicuous long, fine, appressed pubescence. Middle and hind tibiae only with short, appressed pubescence. Colour reddish brown, the appendages lighter.

This species is most closely related to *diomandei* of Ivory Coast. The main characters linking the two species and the features which separate them are discussed under *diomandei*. The characterizations of the complexes of species within the group are given in the species-group discussion.

Tetramorium subcoecum Forel

(Fig. 77)

Tetramorium subcoecum Forel, 1907*c*: 137. Syntype workers, KENYA: Toullo 1905 (*M. de Rothschild*) (MHN, Geneva) [examined].

Tetramorium subcoecum var. *inscia* Forel, 1913*c*: 218. Syntype workers, RHODESIA: Bulawayo, xi.1912, no. 135 (*G. Arnold*) (MHN, Geneva) [examined]. **Syn. n.**

WORKER. TL 2·4–3·0, HL 0·58–0·74, HW 0·52–0·66, CI 85–90, SL 0·40–0·52, SI 75–80, PW 0·34–0·44, AL 0·58–0·80 (10 measured).

Mandibles very feebly sculptured, at most with very faint fine longitudinal striae, often more or less smooth with scattered pits or roughened patches with one or two striae. Anterior clypeal margin with a distinct median impression, the portion of the clypeus immediately behind the impression very shallowly transversely concave. Frontal carinae vestigial or absent, at most an extremely feeble raised line which ends before the level of the eyes; generally weaker than this. Antennal scrobes absent. Eyes minute, of a single ommatidium, the maximum diameter 0·02–0·03, about 0·04–0·06 × HW. Propodeum in profile armed with a pair of short triangular teeth which are as long as or slightly longer than the metapleural lobes, the latter broadly triangular. Petiole in profile with both antero- and posterodorsal angles bluntly rounded. In dorsal view the petiole node slightly broader than long to about as broad as long, the dorsal surface rounding into the front, back and sides, no surfaces separated by angles. Dorsum of head with a few scattered, vestigial longitudinal rugulae, otherwise smooth except for the faintest traces of a superficial ground-sculpture. Dorsal surfaces of promesonotum, petiole, postpetiole and gaster unsculptured, the propodeum usually with vestigial ground-sculpture. Short, standing hairs present on all dorsal surfaces of the head and body but the tibiae of the middle and hind legs only with short appressed pubescence. Colour yellow.

In the *subcoecum*-complex of this group two species are minute and quickly separated from the remainder in size alone. These are *typhlops* and *warreni* and they have HW < 0·50, SL < 0·35. The remaining three species, *subcoecum, amaurum* and *traegaordhi* are larger, and of these *amaurum* is separated by a combination of characters including eyes with 3–5 facets, feeble but visible frontal carinae, rounded metapleural lobes, short pilosity and moderately developed mandibular sculpture. The two remaining species, *subcoecum* and *traegaordhi*, can be separated by the presence in the latter of coarsely sculptured mandibles, eyes with two ommatidia, strongly transverse petiole node which is much broader than long, and long hairs on the alitrunk and gaster. Coupled with this *traegaordhi* lacks the distinct clypeal impression seen in both *subcoecum* and *amaurum*.

MATERIAL EXAMINED

Rhodesia: Bulawayo, Bunlthorne Mine (*G. Arnold*); Matopo Hills (*G. Arnold*). **Botswana**: Maxwee (*A. Russell-Smith*).

Tetramorium termitobium Emery

Tetramorium termitobium Emery, 1908: 186. Holotype worker, ZAIRE: Sankuru (*Luja*) (MCSN, Genoa).

WORKER. TL 2·5–2·8, HL 0·65–0·66, HW 0·60–0·62, CI 92–94, SL 0·50–0·52, SI 81–83, PW 0·38–0·40, AL 0·70–0·72 (2 measured).

Mandibles longitudinally striate. Anterior clypeal margin entire, without notch or impression. Frontal carinae reaching back beyond the level of the eyes but only weakly developed, with a feeble rim; fading out on the occiput and merging with the occipital sculpture. Antennal scrobes very weak, indicated only by a shallow broad concavity of the sides below the frontal carinae. Eyes small, smaller than the maximum width of the scape and with only 3–4 ommatidia across the greatest diameter. Maximum diameter of eye 0·07–0·08, about 0·11–0·13 × HW. With the head in full-face view the sides shallowly but evenly convex, the maximum width being about at the level of the eyes, so that CI > 90. With the alitrunk in profile the metanotal groove distinctly impressed, the dorsum of the propodeum raised into a low triangular prominence immediately behind the groove and then falling away to the spines. Propodeal spines stoutly triangular, acute apically and broad across the base. Metapleural lobes triangular and acute. Node of petiole in profile with the anterodorsal angle a right-angle which is quite sharply defined. Posterodorsal angle not nearly so sharply defined, the dorsum meeting the posterior face in a narrow curve. In dorsal view the petiole node very slightly broader than long. Dorsum of head finely irregularly longitudinally rugulose, the rugulae faint in places. Occipital region of head with a fine ruguloreticulum. Dorsal alitrunk irregularly rugose with numerous cross-meshes which form a loose, open, partial reticulum, particularly on the promesonotum. Dorsal surface of petiole with faint traces of sculpture but the postpetiole virtually smooth, with only the faintest vestiges of sculpture present and most of its surface smooth. First gastral tergite unsculptured. All dorsal surfaces of head and body with scattered short erect hairs, distinctly shorter and more sparse than in related species. Tibiae of middle and hind legs only with short decumbent to appressed pubescence. Colour yellow.

Characters serving to separate *termitobium* from its closest relatives include its short pilosity, broad head, irregular promesonotal sculpture and less strongly developed frontal carinae. See under *intonsum, jugatum* and *shilohense*.

I have not been able to see the holotype of *termitobium* and in consequence this interpretation of the species rests upon the original description and upon a type-compared specimen (by W. L. Brown) in MCZ, Cambridge.

MATERIAL EXAMINED

Gabon: Plateau d'Ipassa (*J. A. Barra*). **Zaire**: Ituri For., vic. Epulu (*T. Gregg*).

Tetramorium traegaordhi Santschi

(Fig. 76)

Tetramorium traegaordhi Santschi, 1914*c*: 23. Syntype workers, SOUTH AFRICA: Natal, Stamford Hill, 7.i.1905 and 26.i.1905 (*I. Trägårdh*) (NM, Basle) [examined].

WORKER. TL 2·8–3·0, HL 0·66–0·69, HW 0·59–0·62, CI 89–90, SL 0·46–0·48, SI 75–81, PW 0·42–0·44, AL 0·76–0·78 (3 measured).

Mandibles strongly and closely longitudinally striate. Anterior clypeal margin entire or at most with a narrow and shallow inconspicuous median impression in the clypeal apron which is not easy to see. Frontal carinae very short and inconspicuous, represented only by a pair of fine, divergent lines which are very narrow and which end at about eye-level. Antennal scrobes absent. Eyes minute, with two ommatidia, their maximum diameter approximately 0·05, about 0·08 × HW. Propodeum in profile armed with a pair of broad triangular teeth; metapleural lobes low, broad and broadly rounded apically. Petiole quite narrow in profile, the height of the tergal portion of the node more than the length of the dorsal surface. Anterodorsal angle of petiole a blunt right-angle in profile, the posterodorsal angle rounded. Petiole node in dorsal view transverse, distinctly broader than long. Dorsum of head with numerous weak, spaced-out fine longitudinal rugulae which do not extend onto the occiput. Spaces between the rugulae with vestiges of superficial ground-sculpture. Dorsal alitrunk with a transverse fine crest on the anterior pronotum and weakly defined lateral margination but otherwise unsculptured. Dorsal surfaces of petiole, postpetiole and gaster unsculptured. All dorsal surfaces of head and body with numerous fine, standing hairs, the longest of which are longer than the maximum width of the hind tibiae. Middle and hind tibiae only with appressed fine pubescence. Colour yellow.

Within the group the species most closely related to *traegaordhi* are *amaurum* and *subcoecum*. In both of these the clypeus has a very distinct median impression, the mandibles are much less strongly sculptured and the pilosity is shorter than in *traegaordhi*. Besides these characters *amaurum* also differs in having larger eyes (3–5 facets), a petiole node which is only just broader than long in dorsal view (much broader in *traegaordhi*), and an alitrunk in which the pronotal transverse crest is vestigial. On the other hand *subcoecum* differs from *traegaordhi* by having eyes of only a single facet and acute metapleural lobes, as well as the characters noted above.

The species *typhlops* and *warreni* are rather more distantly related to *traegaordhi*, but both of these are minute ants with HW < 0·50.

Tetramorium typhlops sp. n.

(Fig. 70)

HOLOTYPE WORKER. TL 2·1, HL 0·50, HW 0·42, CI 84, SL 0·30, SI 71, PW 0·30, AL 0·56.

Mandibles longitudinally striate. Anterior clypeal margin entire, without a median notch or impression. Median carina weakly developed but running the length of the clypeus. Frontal carinae absent, the ends of the weak frontal lobes forming a feeble margin for the posterior portion of the antennal fossa. Antennal scrobes absent, the dorsum of the head rounding into the sides without interruption. Eyes of a single very poorly defined facet, represented only by a discoloured patch on the sides of the head. Diameter of the eye 0·02, about 0·05 × HW. Minute species with HW < 0·45, the antennal scapes both absolutely and relatively short, SL < 0·35, SI < 75. Alitrunk in profile not interrupted at the metanotal groove. Propodeum armed with a pair of short spines which are about as long as the bluntly triangular metapleural lobes. Petiole in profile with a short, thick anterior peduncle and a low node. Anterodorsal angle of petiole a blunt right-angle, the posterodorsal angle not defined, the dorsum rounding into the posterior face. Node of petiole in dorsal view about as long as broad, very slightly broader behind than in front. Dorsum of head with minute and faint irregular longitudinal rugulae and a vestigial ground-sculpture which amounts to no more than a faint roughening of the surface. Dorsal alitrunk unsculptured except for minute punctulae. Petiole, postpetiole and gaster unsculptured. All dorsal surfaces of head and body with short, fine hairs. Dorsal (outer) surfaces of hind tibiae with short pubescence which is mostly subdecumbent. Colour uniform clear pale yellow.

PARATYPE WORKERS. TL 2·0–2·1, HL 0·48–0·50, HW 0·41–0·42, CI 84–85, SL 0·29–0·30, SI 70–71, PW 0·28–0·30, AL 0·54–0·56 (2 measured). As holotype.

Holotype worker, **Ivory Coast**: Lamto (Toumodi), AA80 nid 10, 9.xii.1963 (*J. Lévieux*) (BMNH).

Paratypes. 1 worker with same data as holotype but lacking date; 1 worker with same data but coded AA8J and lacking date (BMNH; MCZ, Cambridge).

One of the two minute species (HW < 0·50, SL < 0·35) known in this group, *typhlops* and *warreni* are isolated from all other species by their very small size, single-faceted eyes, complete lack of frontal carinae and antennal scrobes and vestigial or absent sculpture. These two species are best separated by the condition of the lateral portions of the clypeus which form a raised shield or wall in front of the antennal insertions. In *warreni* this raised wall is strongly developed, distinctly convex above and relatively high. If the head is viewed from behind and slightly above then the clypeal shields can be seen rising in front of the antennal insertions to a height greater than that of the frontal lobes which are immediately dorsal to the insertions. In *typhlops* on the other hand the lateral portions of the clypeus are not nearly so strikingly developed and are not obviously convex above. If the head is viewed from behind and slightly above then the lateral portion of the clypeus slopes away in a more or less straight line towards the side of the head from a point noticeably below the level of the frontal lobes which are immediately dorsal to the antennal insertions.

Other characters useful in separating the two species are the presence of a minute median indentation in the clypeal margin of *warreni*, absent in *typhlops*, and the fact that the petiole node in dorsal view is distinctly broader than long in *warreni*, about as broad as long in *typhlops*.

Tetramorium warreni Arnold

Tetramorium warreni Arnold, 1926: 268, fig. 75. Syntype workers, SOUTH AFRICA: Natal, 15.x.1898 (*Haviland*) (NM, Bulawayo) [examined].

WORKER. TL 2·1–2·3, HL 0·52–0·53, HW 0·44–0·45, CI 84–85, SL 0·30–0·33, SI 68–71, PW 0·30–0·32, AL 0·56–0·58 (2 measured).

Mandibles longitudinally striate. Anterior clypeal margin with a minute median indentation on the apron, difficult to see when mandibles are fully closed. Median carina faint but running the length of the clypeus. Lateral portions of clypeus strongly developed into a raised shield on each side in front of the antennal insertions (see discussion under *typhlops*). Frontal carinae absent, the posteriormost part of the frontal lobes curving outwards around the rim of the antennal fossa for a short distance. Antennal scrobes absent, the dorsum of the head rounding smoothly into the sides. Eyes minute, of a single ommatidium, the maximum diameter approximately 0·03, about 0·07 × HW. Minute species with HW < 0·50, the antennal scapes both absolutely and relatively short, SL < 0·35, SI < 75. Propodeum in profile armed with a pair of short triangular teeth which are about the same length or slightly shorter than the triangular metapleural lobes. Petiole in profile with a narrow node, the dorsal length less than the height of the tergal portion. Posterodorsal angle of node more rounded than the anterodorsal, which is roughly a blunt right-angle. Petiole node in dorsal view broader than long. Dorsum of head with faint, feeble and irregular longitudinal rugulae, with only the weakest vestiges of ground-sculpture between them. Dorsal surfaces of alitrunk, petiole, postpetiole and gaster unsculptured or the alitrunk with a few faint, poorly defined and exceptionally feeble vestiges of sculpture. All dorsal surfaces of head and body with short, fine, standing hairs, the dorsal (outer) surface of the hind tibiae with fine short pubescence. Colour uniform clear, pale yellow.

Like the closely related *typhlops*, *warreni* is distinguished from its closest relatives by its small size, single-faceted eyes, complete lack of frontal carinae and antennal scrobes, and vestigial sculpture. Characters useful in separating *warreni* and *typhlops* are discussed under the latter name.

The *flabellum*-group

(Figs 78–86)

Antennae 12-segmented. Sting appendage triangular or pennant-shaped, sometimes elongate and blunted apically. Mandibles longitudinally striate, usually coarsely so. Anterior clypeal margin entire, without a median notch or impression. Eyes small to moderate, usually in the range 0·18–0·24 × HW, rarely slightly more or less than this. Scapes variable in length, SI usually < 90 but sometimes 100 or more in *flabellum*-complex. Frontal carinae always extending back well beyond the level of the posterior margins of the eyes, commonly approaching the occipital margin but in some fading out roughly midway between the level of the posterior margins of the eyes and the occipital margin. Propodeal spines in profile long and strong, commonly curved or weakly sinuate along their length, always distinctly longer than the metapleural lobes, the latter triangular or dentiform. Petiole in profile nodiform, usually roughly rectangular in shape with the tergal portion slightly longer than high. (In *coloreum*-complex this shape modified as the dorsal and posterior faces meet in a broad curve.) Petiole node in dorsal view usually longer than broad, if only slightly so; rarely otherwise. Sculpture strong, predominantly of longitudinal rugosity or reticulate-rugulation except in *granulatum*-complex where dense reticulate-punctate sculpture predominates. Standing pilosity on dorsal surfaces of head and body distinct in all species except *bellicosum* (appressed), the hairs usually numerous, stout and blunted apically; rarely bizarre (*flabellum*) or short, very fine and very dense (*granulatum*). Dorsal (outer) surfaces of middle and hind tibiae with fine short decumbent to appressed pubescence.

Almost all of the species included in this group are distributed within the forest zones of West and Central Africa. Only a single species (*kestrum*) occurs in the drier forests of the eastern parts of the continent.

The group divides up into four complexes of related species. The first three complexes discussed below are closely related, the fourth and final complex is rather more distant, not easily associated with any other group and included here for convenience as the vast majority of characters shown agree with the diagnosis of this species-group.

The *flabellum*-complex contains the five species *ataxium*, *flabellum*, *geminatum*, *kestrum* and *sigillum* and is characterized within the group by possession of relatively long antennal scapes (SI

90– > 100), strongly developed sculpture and frontal carinae and a rectangular outline to the petiole node in profile. Besides these the clypeal sculpture tends to consist of a strong median carina subtended by 2–4 weaker rugulae which run diagonally on the clypeus from the posterolateral margins towards the median carina. Of the five species all but *kestrum* are restricted to the rain forest zones of West and Central Africa, but *kestrum* is widely distributed in the drier woodlands of the eastern and southern parts of the continent.

The second complex contains only *saginatum* and *pylacum* and is very closely related to the *flabellum*-complex, differing mainly in having shorter antennal scapes (SI 80–85) and relatively broader heads (CI 89–95) than in members of that complex where SI is 90 or more and CI ranges 84–89. Apart from this the clypeus has different sculpture, consisting of a strong median carina flanked by 2–4 weaker longitudinal carinae or longitudinal rugulae. In some respects the two members of this complex form a link between *flabellum* and its allies on the one hand and the *coloreum*-complex on the other, as they show clypeal sculpture characteristic of the latter but have the petiole shaped as in the former.

The three species of the *coloreum*-complex (*coloreum, invictum, postpetiolatum*) have longitudinal clypeal sculpture, relatively short scapes (SI 77–83) and broad heads (CI 90–95) as seen in the *pylacum*-complex, but have the petiole node differently constructed than in either of the foregoing complexes. In fact *postpetiolatum* is intermediate between *pylacum* and *coloreum* in this respect as its node is shaped between the low rectangular shape seen in *pylacum* and the higher, narrower node of *coloreum* (see Figs 80–82). In this last-named species and in *invictum* the dorsal and posterior faces of the node meet in a continuous curve or arc, without a posterodorsal angle. All the members of these complexes are only found in West and Central Africa.

Finally, the *granulatum*-complex, consisting only of the species *bellicosum* and *granulatum* which are only known from Nigeria. As stated above these two species may not belong in the *flabellum*-group but their basic characters lead me to include them here for the time being. Apart from the group-characters these species are characterized by their sculpture, which is dominated by a very dense, fine blanketing reticulate-puncturation on the head, alitrunk and pedicel segments. Rugular sculpture when present is very feeble and obviously secondary to the punctation. Frontal carinae are not as strongly developed as in the preceding complexes, tending to fade out on the occipital area of the head. The usual pilosity of stout, blunted standing hairs, developed throughout the rest of the group (except in *flabellum*) is not present here. Instead *granulatum* has abundant short fine pilosity everywhere and *bellicosum* has flattened, appressed hairs widely scattered on the body.

Tetramorium ataxium sp. n.

(Figs 78, 86)

HOLOTYPE WORKER. TL 3·1, HL 0·74, HW 0·64, CI 86, SL 0·64, SI 100, PW 0·46, AL 0·86.

Mandibles longitudinally striate. Anterior clypeal margin entire, without a notch or impression. Median clypeal carina strongly developed, running the length of the clypeus. A few feeble rugulae branch off the median carina and run to the lateral margins of the clypeus posterior to their point of origin. Lateral portions of clypeus forming a strongly developed wall in front of the antennal insertions, seen as a high prominence when the head is viewed from above and slightly behind. Frontal carinae conspicuous, reaching back well beyond the level of the eyes and tending to merge into the rugoreticular sculpture occipitally. Antennal scapes long, SI 100 in holotype (measured range of SI 95–101 in material examined). Antennal scrobes present but shallow. Eyes moderate in size, maximum diameter 0·14, about 0·22 × HW. Propodeal spines in profile long and stout, very feebly downcurved along their length, distinctly longer than the broad, acutely triangular metapleural lobes. Petiole in profile an elongate node, the dorsal length greater than the height of the tergal portion of the node. In dorsal view the petiole node longer than broad, broader behind than in front. Dorsum of head longitudinally rugose to level of posterior margins of eyes, with few cross-meshes, but behind this zone a rugoreticulum is present. Ground-sculpture between the rugulae a fine punctulation. Dorsal surfaces of alitrunk, petiole and postpetiole reticulate-rugose with punctulate interspaces, the latter most distinct on the pedicel segments. The dorsal rugae of the petiole and postpetiole are less conspicuous or effaced on the sides of the segments and in consequence the punctulate sculpture is more distinctive there. Gaster unsculptured, smooth and shining. All dorsal surfaces of head and body with numerous coarse, often blunted hairs. The hairs on the dorsum of the head (discounting the very long ones on clypeus and occiput), and those on the first gastral tergite at most about as long as maximum diameter of eye, never obviously longer, generally rather shorter than eye diameter. Dorsal (outer) surfaces of middle and hind tibiae only with fine decumbent to appressed pubescence. Colour dark brown.

PARATYPE WORKERS. TL 3·0–3·5, HL 0·74–0·80, HW 0·64–0·70, CI 84–89, SL 0·60–0·68, SI 95–101, PW 0·42–0·50, AL 0·80–0·96 (20 measured). As holotype but colour varying from dark brown to blackish brown, sometimes with a reddish tint. Propodeal spines sometimes approximately straight but usually slightly downcurved, slightly upcurved or even feebly sinuate. Maximum diameter of eye 0·14–0·16, about 0·21–0·24 × HW.

Holotype worker. **Nigeria**: Ibadan, I.I.T.A., 16–23.ix.1974 (*B. R. Critchley*) (BMNH).

Paratypes, **Nigeria**: 5 workers with same data as holotype. **Ivory Coast**: 36 workers, Palmeraie de Lame, no. 8, 23.i.1976 (*T. Diomande*). (BMNH; MCZ, Cambridge; NM, Basle.)

Non-paratypic material examined. **Guinea**: Keoulenta (*Lamotte*). **Ivory Coast**: Lamto (*J. Lévieux*). **Ghana**: Mampong (*D. Leston*); Mampong (*P. M. Room*); Mt Atewa (*D. Leston*); Tafo (*B. Bolton*); Legon (*D. Leston*); Kibi (*D. Leston*). **Nigeria**: Gambari (*B. Bolton*); Gambari (*B. Taylor*); Ile-Ife (*J. T. Medler*); Mokwa (*B. Lasebikan*).

T. ataxium appears to be the commonest and most widely distributed member of the *flabellum*-complex of this group in West Africa. Its close relatives within the group include *flabellum*, *geminatum*, *kestrum* and *sigillum*, all of which are characterized by their long scapes (SI > 90, often 100 or more), coarse sculpture, rectangular petiole outline and coarse, blunted pilosity. Of these *flabellum* is immediately separable by its possession of bizarre fan-like hairs, absent from the other species, *T. sigillum* differs from *ataxium* by being smaller and by having an unsculptured postpetiolar dorsum, or at least a broad smooth median strip. *T. kestrum* occurs in eastern and southern Africa, its range does not appear to overlap that of *ataxium*, and it is much lighter in colour (yellow-brown to light orange-brown) with SI consistently 100 or more. The species closest related to *ataxium* is *geminatum*, known only from Gabon and separated on the relative lengths of pilosity in the two species as indicated in the key. Apart from this character the mandibular striation is feeble in *geminatum* and the punctulate ground-sculpture of the alitrunk and pedicel undeveloped or very feeble.

Tetramorium bellicosum sp. n.

HOLOTYPE WORKER. TL 3·6, HL 0·82, HW 0·76, CI 93, SL 0·64, SI 84, PW 0·50, AL 0·98.

Mandibles longitudinally striate. Anterior clypeal margin entire, without a median notch. Median clypeal carina strongly developed, much more conspicuous than the remaining clypeal sculpture. Frontal carinae running back well beyond the level of the eyes, fading out occipitally, but only weakly developed throughout their length as a pair of narrow and feebly raised lines. Antennal scrobes vestigial, represented only by a broad and very shallow impression in the sides of the head below the frontal carinae. Eyes moderate, maximum diameter 0·18, about 0·24 × HW. Propodeum armed with a pair of broad elongate spines which are distinctly longer than the broadly triangular metapleural lobes. Petiole node in profile roughly rectangular in shape, the dorsum feebly convex and the dorsal length slightly greater than the height of the tergal portion. In dorsal view the petiole node distinctly longer than broad. All surfaces of head, alitrunk, petiole and postpetiole blanketed by a fine, dense and very conspicuous reticulate-puncturation. Rugulose sculpture minimal and everywhere secondary to the punctation. A few fine, feeble longitudinal rugulae are present on the dorsum of the head but the scrobal area (below the frontal carinae and above the eyes) entirely punctulate. Dorsal alitrunk with a few scattered vestigial rugulae, especially on the pronotum. Base of first gastral tergite finely punctulate or shagreened, more feebly sculptured than the postpetiole. Pilosity bizarre and highly characteristic. Standing hairs absent from all surfaces of head and body except for clypeus and gastral apex, the head and alitrunk dorsally having instead a scattering of short, flattened hairs which are reclinate, appressed to the surface from which they arise. On the petiole, postpetiole and gaster similar flattened appressed hairs are present but they are longer, more numerous and more conspicuous than on the head and alitrunk. In profile both the petiole and postpetiole with 2–3 of these hairs projecting beyond the posterior margin on each side. Tibiae of middle and hind legs only with minute appressed pubescence. Colour dull red, the gaster dark brown.

PARATYPE WORKERS. TL 3·4–3·6, HL 0·80–0·84, HW 0·73–0·76, CI 88–93, SL 0·60–0·64, SI 82–87, PW 0·48–0·52, AL 0·92–0·98 (5 measured). Maximum diameter of eye 0·18–0·19, about 0·24–0·25 × HW. As holotype but mostly with the propodeal spines slightly downcurved along their length.

Holotype worker, **Nigeria**: Gambari, 10.vi.1969, leaf litter (*B. Bolton*) (BMNH).

Paratypes. 3 workers with same data as holotype; 2 workers from same locality but 16.x.1975, nest in ground, W17, black pod project (*B. Taylor*) (BMNH; MCZ, Cambridge).

One of the two species in this group which has blanketing reticulate-punctate sculpture (the other is *granulatum*), *bellicosum* is easily identified by its bizarre pilosity.

Tetramorium coloreum Mayr

(Fig. 81)

Tetramorium coloreum Mayr, 1901*a*: 273. Syntype workers, CAMEROUN: Mungo-Fluss, x.1874 (*R. Buchholz*) (NM, Vienna) [examined].

Tetramorium humerosum subsp. *muscicola* Bernard, 1952: 246. Syntype workers, GUINEA: Nimba N-E. (*Villiers*) (types not in MNHN, Paris; presumed lost). **Syn. n.**

WORKER. TL 3·0–3·6, HL 0·76–0·88, HW 0·70–0·82, CI 90–95, SL 0·58–0·66, SI 79–83, PW 0·50–0·58, AL 0·82–0·92 (20 measured).

Mandibles finely longitudinally striate. Anterior clypeal margin entire, without a notch or impression. Clypeus usually with three longitudinal carinae, more rarely with four or five. Frontal carinae long, reaching back almost to the occipital margin, but not strongly developed, surmounted by a low rim or flange dorsally. Antennal scrobes broad and shallow. Maximum diameter of eye 0·15–0·18, about 0·20–0·23 × HW. Alitrunk relatively short and broad (see measurements), the dorsum in profile distinctly arched from front to back. Propodeum armed with a pair of long, narrow, more or less straight spines. Metapleural lobes very long and narrow, spiniform and elevated, but shorter than the propodeal spines. Petiole node in profile high and narrow, the dorsal length less than the height of the tergal portion; node variable in shape but always with an approximately vertical anterior face and a short dorsum which rounds more or less evenly into the convex posterior face. A diagonal ridge or rugula runs across the side of the node from the anterodorsal angle almost to the posteroventral corner and is usually very distinct. In dorsal view this ridge is seen to be continuous, running in an arc across the dorsum at the junction of the anterior and dorsal faces as a narrow raised line or crest. Petiole node in dorsal view slightly longer than broad. Dorsum of head with a few widely spaced longitudinal rugae which run to the occipital margin where a few weak anastomoses are sometimes present; there is, however, no trace of a reticulum occipitally. Dorsal alitrunk with irregular low longitudinal rugae, the dorsal surfaces of the petiole and postpetiole always with fine, longitudinal rugulae present, denser on the latter. Base of first gastral tergite sculptured, either finely densely striate or shagreened. All dorsal surfaces of head and body with numerous or abundant stout standing hairs. Colour conspicuous: head, gaster (and usually also the legs) yellow, alitrunk (and usually also pedicel segments) black or dark brown, the two colours strongly contrasting. Colour of the legs is variable, usually yellow like the head, sometimes brown but never as dark as the alitrunk. Petiole and postpetiole sometimes as dark as alitrunk, commonly lighter than the alitrunk but darker than the gaster. Rarely the petiole notably darker than the postpetiole.

The distinctive colour pattern of this species quickly distinguishes *coloreum* from all other species except *postpetiolatum*, its closest relative. Black and yellow bicoloured species are known from elsewhere, both in Africa (*flavithorax*) and in the Indo-Australian region (*bicolor* Viehmeyer, *tricarinatum* Viehmeyer, *diligens* (F. Smith)) but in all of these it is the alitrunk which is yellow whilst the head and gaster are black or dark brown, the opposite of the arrangement seen in *coloreum* and *postpetiolatum*.

These last two species, together with *invictum*, form a close complex within the *flabellum*-group characterized by the shape of the node, as discussed above. Of the three *invictum* is uniform blackish brown and coarsely sculptured, the other two are bicoloured. *T. postpetiolatum* is best separated by the fact that its postpetiole lacks rugular sculpture on the disk and the first gastral tergite is smooth. Besides this the petiole node, although generally the same shape as in *coloreum*, tends to be thicker and more stockily built, as broad as long or even broader than long in dorsal view.

The types of *humerosum* subsp. *muscicola* cannot be found in MNHN, Paris and are presumed lost. The name is included as a synonym of *coloreum* as Bernard (1952) indicates a bicoloured pattern very reminiscent of *coloreum* and states that the gaster is 'striate-mat longitudinally'. As stated above, only *coloreum* combines these characters in the Ethiopian region so it seems reasonable to relegate *muscicola* to the synonymy of *coloreum*.

MATERIAL EXAMINED

Cameroun: ser. IT (no loc.) (*G. Terron*); no loc., ex coll. Mayr. **Gabon**: Ile aux Singes (*J. A. Barra*); Plateau d'Ipassa (*J. A. Barra*). **Zaire**: Ituri Forest, vic. Epulu (*T. Gregg*).

Tetramorium flabellum sp. n.

HOLOTYPE WORKER. TL 3·0, HL 0·74, HW 0·65, CI 88, SL 0·62, SI 95, PW 0·48, AL 0·90.

Mandibles longitudinally striate. Anterior clypeal margin entire. Median clypeal carina strong, with a few weaker rugulae arising from it and running posterolaterally. Lateral portions of clypeus strongly raised into a very conspicuous shield in front of each antennal insertion. Frontal carinae strong, reaching back to occipital region where they merge with the rugoreticulum present there. Antennal scapes relatively long, SI in range 94-100 (95 in holotype). Antennal scrobes narrow and shallow. Maximum diameter of eye 0·13, about 0·20 × HW. Propodeal spines long and strong, feebly sinuate in profile, much longer than the broad, acutely triangular metapleural lobes. Petiole node in profile rectangular, the dorsal length slightly greater than the height of the tergal portion. In dorsal view the petiole node slightly longer than broad. Dorsum of head predominantly longitudinally rugose to level of posterior margins of eyes, with few or no cross-meshes to this level. Behind the level of the eyes with a strong rugoreticulum which extends to the occipital margin. Sides of head uniformly reticulate-rugose except in scrobal area where the sculpture is interrupted directly below the frontal carinae. Dorsal surfaces of alitrunk and pedicel segments reticulate-rugose, feebler on the postpetiole than on the petiole. Ground-sculpture everywhere on the dorsum vestigial, at most a few superficial punctulae between the rugose meshes. First gastral tergite unsculptured. Pilosity bizarre and highly characteristic. Each main hair on the dorsum of the head and body consisting of a short basal shaft, from the apex of which radiate 9–12 branches in a flat plane, reminiscent of the ribs of an open fan. Dorsal surfaces of middle and hind tibiae with dense but short decumbent pubescence only. Colour dark brown.

PARATYPE WORKERS. TL 2·9–3·2, HL 0·72–0·78, HW 0·62–0·68, CI 86–89, SL 0·62–0·66, SI 94–100, PW 0·46–0·50, AL 0·86–0·96 (12 measured). Maximum diameter of eye 0·13–0·14, about 0·19–0·21 × HW. As holotype but Ivory Coast paratypes somewhat lighter brown than those from Ghana. Shape of propodeal spines variable, commonly slightly downcurved or feebly sinuate along their length, more rarely approximately straight.

Holotype worker, **Ghana**: Tafo, 3.ix.1970, rotten log (*B. Bolton*) (BMNH).

Paratypes. **Ghana**: 6 workers with same data as holotype; 1 worker same locality but 31.viii.1970, litter sample (*B. Bolton*). **Ivory Coast**: 5 workers, Forêt de Tai, 9.viii.1975, no. 4 (*T. Diomande*) (BMNH; MCZ, Cambridge; NM, Basle).

The spectacular bizarre pilosity of *flabellum* will immediately differentiate the species from all other known members of genus *Tetramorium* in the Ethiopian region.

Tetramorium geminatum sp. n.

HOLOTYPE WORKER. TL 3·4, HL 0·80, HW 0·70, CI 88, SL 0·67, SI 96, PW 0·52, AL 0·96.

Mandibles longitudinally striate. Anterior clypeal margin entire, without a notch or impression. Median clypeal carina strongly developed, much stronger than the pair of ridges which arise at the apices of the frontal lobes and run anteromedially on the clypeus towards the median carina. Frontal carinae strongly developed, running back onto the occipital surface but ending abruptly before reaching the occipital margin; distance from ends of carinae to occipital margin slightly greater than maximum diameter of eye. Scapes long, SI > 90 (range 96–100); antennal scrobes shallow and broad but conspicuous. Maximum diameter of eye 0·14, about 0·20 × HW. Propodeal spines long and strong, feebly sinuate and acute apically. Metapleural lobes broadly triangular. Petiole node in profile rectangular, the dorsal length greater than the height of the tergal portion. In dorsal view the petiole node slightly longer than broad. Dorsum of head with widely spaced longitudinal rugae to the level of the posterior margins of the eyes. Between this level and the ends of the frontal carinae a few cross-meshes are present; occipital area reticulate-rugose. Dorsal surfaces of alitrunk and petiole reticulate-rugose but the sculpture of the propodeal dorsum weaker and predominantly longitudinal. Ground-sculpture between the rugulae everywhere very feeble so that the surfaces are glossy. First gastral tergite unsculptured. All dorsal surfaces of body with numerous long, stout hairs which are blunted apically; longest hairs on dorsal alitrunk and first gastral tergite longer than maximum diameter of eye. Colour reddish brown, dark and glossy.

Paratype workers. TL 3·0–3·4, HL 0·72–0·80, HW 0·62–0·70, CI 85–89, SL 0·62–0·68, SI 96–100, PW 0·42–0·52, AL 0·82–0·96 (9 measured). Maximum diameter of eye 0·12–0·14, about 0·19–0·21 × HW. As holotype but length and shape of propodeal spines variable, being slightly upcurved, slightly downcurved or feebly sinuate.

Holotype worker, **Gabon**: Plateau d'Ipassa, 9 IPA, AN6 (*J. A. Barra*) (MCZ, Cambridge).

Paratypes. 7 workers with same data as holotype; 1 worker same locality but AMC2, IPA (*J. A. Barra*); 1 worker same locality but 9 IPA, AN4 (*J. A. Barra*) (MCZ, Cambridge; BMNH).

This species is most closely related to *ataxium*, from which it differs by its longer pilosity and reduced ground-sculpture. In *ataxium* the hairs on the dorsum of the head (discounting those on the clypeus and the occipital margin) and on the first gastral tergite are predominantly, and in most series obviously, shorter than the maximum diameter of the eye. Some specimens of *ataxium* have hairs which approach this length but none have them obviously longer, which is the case in *geminatum*. Besides this, the punctulate ground-sculpture which is conspicuous in *ataxium* is very reduced in *geminatum* and not at all obvious.

Tetramorium granulatum sp. n.

(Fig. 83)

Holotype worker. TL 3·5, HL 0·82, HW 0·74, CI 90, SL 0·66, SI 89, PW 0·50, AL 0·96.

Mandibles longitudinally striate. Anterior clypeal margin arcuate and entire, without trace of a median impression. Median clypeal carina weak, scarcely stronger than the longitudinal rugulae on the clypeus. Lateral portions of clypeus strongly developed, forming a distinct shield in front of each antennal insertion. Frontal carinae strongly developed to the level of the posterior margins of the eyes, behind this level rapidly merging into the cephalic sculpture. Antennal scrobes shallow, the scapes quite long (SI 89–92 in type-series). Maximum diameter of eye 0·15, about 0·20 × HW. Dorsal alitrunk without trace of metanotal impression in profile. Propodeum armed with a pair of broad-based, thick, thorn-like spines which are distinctly elevated and shallowly curved along their length. Metapleural lobes low and broadly triangular. Petiole in profile with a thick anterior peduncle and a low long node, the posterodorsal angle obliterated so that the dorsum curves into the posterior face. Postpetiole in profile paniform, very low, shallowly and evenly convex from front to back. In dorsal view the petiole node narrow, longer than broad; postpetiole as long as broad. Dorsum of head with very fine longitudinal rugulae and with a narrow-meshed dense rugulo-reticulum occipitally but this sculpture (and that of sides of head) dominated by, and secondary to, a dense reticulate-puncturation which blankets the head capsule. Alitrunk, petiole and postpetiole also entirely covered by dense reticulate-punctate sculpture. The alitrunk also with a few feeble rugulae dorsally which form an irregular reticulum on the pronotum but are longitudinal elsewhere. Rugular sculpture on pedicel segments vestigial. Base of first gastral tergite finely reticulate-punctulate. All dorsal surfaces of head and body very densely covered with fine short hairs, the longest of those on the dorsal alitrunk distinctly much shorter than the maximum diameter of the eye. On the posterior two-thirds of the first gastral tergite the more centrally-situated hairs are directed towards the midline. Dorsal (outer) surfaces of hind tibiae with short, dense, decumbent pubescence. Colour dull red, the gaster slightly darker than the head and alitrunk.

Paratype worker, TL 3·7, HL 0·82, HW 0·74, CI 90, SL 0·68, SI 92, PW 0·50, AL 0·98. Maximum diameter of eye 0·15; as holotype.

Holotype worker, **Nigeria**: Gambari, C.R.I.N., 20.viii.1975, ES/1 UHE, soil at base tree, 305 SFA 77·2, blackpod project (*B. Taylor*) (BMNH).

Paratype. 1 worker with same data as holotype (MCZ, Cambridge).

Within the *flabellum*-group only two species, *granulatum* and *bellicosum*, have a predominantly reticulate-punctate sculpture, elsewhere in the group the sculpture being predominantly or entirely rugular. Of the two punctate species *granulatum* is covered by a fine, dense coat of short, erect hairs whilst in *bellicosum* the pilosity is bizarre, consisting of scattered elongate hairs which are strongly dorsoventrally flattened and are appressed. This difference in pilosity form will quickly separate the two species.

Tetramorium invictum sp. n.

(Fig. 84)

Holotype worker. TL 3·3, HL 0·80, HW 0·75, CI 94, SL 0·60, SI 80, PW 0·52, AL 0·86.

Mandibles longitudinally striate. Anterior clypeal margin entire, without trace of a median notch but with an exceptionally feeble indentation medially in the holotype, difficult to see and variably absent or present in the type-series (which are from a single nest). Median clypeal carina distinct but not more strongly developed than the remaining longitudinal clypeal sculpture. Frontal carinae long, running back almost to the occipital margin but no more strongly developed than the dorsal cephalic sculpture. Antennal scrobes broad and shallow, the scapes of moderate length (SI 80 in holotype, range 77–82). Maximum diameter of eye 0·16, about 0·21 × HW. Alitrunk short and broad (see measurements), the dorsal outline in profile strongly arched from front to back. Propodeal spines long and narrow, extremely feebly sinuate along their length. Metapleural lobes spiniform, long and narrow. Petiole in profile with a narrow anterior peduncle, the node high, its dorsal length being less than the height of the tergal portion. Anterior face of node vertical or nearly so, meeting the dorsum in a blunt right-angle. Dorsum short and curving evenly into the weakly convex posterior face so that the two form a single curved surface. Petiole node in dorsal view longer than broad, rounded anteriorly, broadening posteriorly for about two-thirds of its length and then narrowing again to the postpetiolar junction. Dorsum of head irregularly longitudinally rugulose with scattered weak cross-meshes behind the level of the eyes but without a distinct reticulum occipitally. Dorsal alitrunk irregularly rugose, predominantly longitudinal on the pronotum and reticulate elsewhere. Dorsal surfaces of petiole and postpetiole irregularly finely rugulose with fine punctulate ground-sculpture which is more conspicuous here than on the alitrunk. First gastral tergite finely striolate-punctulate basally. All dorsal surfaces of head and body with numerous short, stout standing hairs, most of which are blunt apically. Dorsal (outer) surfaces of hind tibiae with short appressed pubescence only. Colour very dark blackish brown.

Paratype workers. TL 3·1–3·3, HL 0·76–0.82, HW 0·70–0·76, CI 92–95, SL 0·57–0·62, SI 77–82, PW 0·50–0·54, AL 0·82–0·92 (20 measured). Maximum diameter of eye 0·15–0·16, about 0·20–0·22 × HW. As holotype but colour varying from uniform blackish brown to black, sometimes with the gaster slightly paler. Pronotum weakly reticulate-rugose in some and the propodeal spines variously shaped, being feebly upcurved, downcurved or sinuate.

Holotype worker, **Ivory Coast**: Forêt de Tai, 19.vi.1975, no. 1 (*T. Diomande*) (BMNH).

Paratypes. 32 workers with same data as holotype (BMNH; MCZ, Cambridge; NM, Basle).

Non-paratypic material examined. **Ivory Coast**: Teke Forest (*T. Diomande*). **Ghana**: Kade (*D. Leston*); Mt Atewa (*B. Bolton*).

T. invictum is most closely related to *coloreum* and *postpetiolatum*, but both these species are conspicuously bicoloured, black (or dark brown) and yellow, whereas *invictum* is uniformly dark.

Tetramorium kestrum sp. n.

Holotype worker. TL 3·1, HL 0·74, HW 0·66, CI 89, SL 0·68, SI 103, PW 0·47, AL 0·90.

Mandibles longitudinally striate. Anterior clypeal margin entire, without a median notch or impression. Median clypeal carina strong, the remaining clypeal sculpture converging upon it. Frontal carinae strongly developed, reaching back almost to the occipital margin before merging with the cephalic sculpture. Antennal scapes long, SI 100 or more (103 in holotype; range 100–106). Maximum diameter of eye 0·14, about 0·21 × HW. Propodeal spines long and strong, feebly sinuate along their length. Metapleural lobes triangular and acute. Petiole node in profile rectangular, the length of the dorsum slightly greater than the height of the tergal portion of the node. In dorsal view petiole node slightly longer than broad. Dorsum of head to level of posterior margins of eyes with a few strong, widely spaced longitudinal rugae; behind this level and also on the sides above the eyes with a distinct rugoreticulum. Dorsal surfaces of alitrunk, petiole and postpetiole reticulate-rugose, the last more weakly so than the preceding areas. Ground-sculpture between the reticulations minimal on the head and alitrunk so that the surfaces are glossy, but the pedicel segments with some feeble punctulation. First gastral tergite unsculptured. All dorsal surfaces of head and body with numerous standing hairs which are long, stout and blunted apically. Dorsal surfaces of hind tibiae only with minute appressed pubescence. Colour bright orange-brown, the legs yellow.

Paratype workers. TL 3·0–3·1, HL 0·74–0·76, HW 0·64–0·66, CI 84–89, SL 0·64–0·68, SI 100–106, PW 0·47–0·48, AL 0·90–0·92 (8 measured). Maximum diameter of eye 0·14, about 0·21–0·22 × HW.

Holotype worker, **Uganda** ('Kenya-Uganda border' on data label): Busnia, 17.ii.1948, no. 2080 (*N. A. Weber*) (MCZ, Cambridge).

Paratypes. 5 workers with same data as holotype; 3 workers with same data but the number 2080 omitted (MCZ, Cambridge; BMNH; NM, Basle).

Non-paratypic material examined. **Sudan**: Equatoria, Kagelu (*N. A. Weber*). **Uganda**: 10 miles [16 km] ENE. of Budibugyo, Ruwenzori (*G. O. Evans*). **Zaire**: Niangara (*N. A. Weber*). **Angola**: Dundo, Carrisso Park (*L. de Carvalho*).

This species is closely related to *ataxium* and is best separated from it by colour, which in *kestrum* ranges from yellowish brown to orange-brown whilst *ataxium* is dark brown to blackish brown. To this may be added the fact that the ground-sculpture of *kestrum* is obsolete and the scapes tend to be somewhat longer, with SI 100–106 whilst in *ataxium* only a few specimens have SI 100 or slightly more, most having SI 95–99. The two species obviously form a sibling pair and both have a wide distribution, *ataxium* throughout the wet forest zone of West Africa and *kestrum* in the eastern and more southern forested parts of the continent. Their respective ranges do not appear to overlap and it is assumed that they are mutually exclusive.

Tetramorium postpetiolatum Santschi

(Fig. 80)

Tetramorium coloreum var. *postpetiolata* Santschi, 1919: 88. Syntype workers, ZAIRE: Penghe, 25.i.1914, no. 113 (*Bequaert*) (NM, Basle; MRAC, Tervuren) [examined].
Tetramorium postpetiolatum Santschi; Brown, 1956: 75. [Raised to species.]

WORKER. TL 3·2–3·4, HL 0·76–0·82, HW 0·70–0·76, CI 92–95, SL 0·56–0·60, SI 77–81, PW 0·50–0·54, AL 0·90–0·94 (10 measured).

Answering to the description given for *coloreum* and in particular sharing the very conspicuous colour pattern of that species; with head, gaster and legs yellow and alitrunk dark brown, the two strongly contrasting. In *postpetiolatum* there is a tendency for the petiole to be as darkly coloured as the alitrunk and the postpetiole to be much lighter, almost as light as the gaster. Measurements of *postpetiolatum* as given above, and size of eye, fall within the limits given under *coloreum*. The two species differ as follows.

postpetiolatum	*coloreum*
Disc of postpetiole unsculptured.	Disc of postpetiole finely longitudinally rugulose.
Base of first gastral tergite unsculptured.	Base of first gastral tergite sculptured.
Mandibles smooth or at most with only faint sculpture.	Mandibles distinctly longitudinally striate.
Metapleural lobes acutely triangular, low.	Metapleural lobes very long, spiniform, elevated.
Dorsum of petiole node relatively longer in profile (Fig. 80).	Dorsum of petiole node relatively shorter in profile (Fig. 81).
Petiole node in dorsal view as long as broad or broader than long.	Petiole node in dorsal view longer than broad.

MATERIAL EXAMINED

Zaire: Ituri Forest, vic. Epulu (*T. Gregg*); Ituri For., Beni-Irumu (*N. A. Weber*).

Tetramorium pylacum sp. n.

(Figs 82, 85)

HOLOTYPE WORKER. TL 3·7, HL 0·90, HW 0·84, CI 93, SL 0·68, SI 81, PW 0·62, AL 1·06.

Mandibles longitudinally striate. Anterior clypeal margin entire, without trace of a median notch or impression. Median clypeal carina strong, flanked by a pair of weaker carinae between which are a pair of still weaker rugulae. Frontal carinae strong, running back almost to occipital margin. Antennal scrobes broad and shallow. Maximum diameter of eye 0·16, about 0·19 × HW. Alitrunk relatively short and broad (see measurements), the dorsum in profile convex. Propodeal spines long and strong, very feebly sinuate along their length. Metapleural lobes broadly triangular and acute. Petiole in profile roughly rectangular, the dorsal length of the node greater than the height of the tergal portion; the dorsum itself shallowly convex. Node of petiole in dorsal view slightly longer than broad. Dorsum of head with spaced longitudinal rugae which are almost as strongly developed as the frontal carinae; seven such rugae occur between the frontal carinae at the level of the eyes. Occipitally the rugae with a few anastomoses but without a developed reticulum. Dorsal surfaces of alitrunk, petiole and postpetiole irregularly reticulate-rugose, the meshes on the pedicel segments finer and more closely packed than on the alitrunk, and also more irregular. Base of first gastral tergite finely and quite densely longitudinally costulate, the spaces between the costulae finely punctulate. All dorsal surfaces of head and body with numerous stout, standing hairs, most of which are blunt apically. Dorsal (outer) surfaces of hind tibiae only with minute decumbent pubescence. Blackish brown, the first gastral tergite slightly lighter brown.

PARATYPE WORKERS. TL 3·3–3·7, HL 0·82–0·90, HW 0·74–0·84, CI 91–94, SL 0·62–0·68, SI 81–85, PW 0·55–0·64, AL 0·98–1·08 (6 measured). Maximum diameter of eye 0·14–0·16, about 0·18–0·20 × HW. As holotype but some with only three carinae on the clypeus, the median rugulae missing or vestigial. Seven or eight rugae may be present between the frontal carinae at eye-level and rarely a weak reticulated strip is present on the extreme posterior portion of the occiput.

Holotype worker, **Ivory Coast**: Tai Forest, 11.iii.1976, no. 7 (*T. Diomande*) (BMNH).

Paratypes. **Ivory Coast**: 4 workers with same data as holotype; 2 workers, Nzi Noua C.I., 17.iii.1969 (*J. Lévieux*) (BMNH; MCZ, Cambridge).

The two species *pylacum* and *saginatum* represent a separate complex within the group, closely related to the members of the *flabellum*-complex and derived from them. Both complexes share the same basic characters within the group but in *pylacum* and *saginatum* the heads are relatively broad (CI 89–95) and the antennal scapes shorter (SI 80–85) than is usual in *flabellum* and its allies (CI 84–89, SI 90– > 100). *T. pylacum* is quickly separable from its closest relative *saginatum* as in the former the base of the first gastral tergite is sculptured with fine dense costulation with punctulate interspaces, whereas in the latter the base of the first tergite is unsculptured except for the pits from which stout hairs arise.

Tetramorium saginatum sp. n.

HOLOTYPE WORKER. TL 3·1, HL 0·74, HW 0·67, CI 90, SL 0·56, SI 83, PW 0·52, AL 0·84.

Mandibles coarsely longitudinally striate. Anterior clypeal margin entire, without trace of an impression medially. Median clypeal carina strong, otherwise clypeus with only scattered vestiges of rugular sculpture. Frontal carinae strong, running back onto occiput but merging with the remaining cephalic sculpture before reaching the margin. Antennal scapes of moderate length (SI 80–85 in type-series), the scrobes broad and shallow, not conspicuously developed. Eyes small, maximum diameter 0·13, about 0·19 × HW. Alitrunk convex in profile, the propodeal spines broad, only slightly longer than the long, acutely triangular and broad-based metapleural lobes. Petiole node in profile short rectangular, almost square, the dorsal length only marginally greater than the height of the tergal portion. In dorsal view the petiole node slightly broader than long. Dorsum of head irregularly longitudinally rugulose to level of posterior margins of eyes, with 7–8 rugulae between the frontal carinae at eye level and with few or no cross-meshes. Behind the level of the eyes cross-meshes increase in number until they form a rugoreticulum on the occiput. Dorsal surfaces of alitrunk, petiole and postpetiole finely reticulate-rugulose, denser on the pedicel segments than on the alitrunk. Ground-sculpture a fine superficial punctulation, effaced and vestigial on the head, more conspicuous on the posterior half of the alitrunk and on the pedicel segments. Base of first gastral tergite unsculptured except for pits from which hairs arise, which are fairly distinct basally. All dorsal surfaces of head and body with numerous stout standing hairs, obviously blunted on the surfaces behind the head. Hind tibiae with decumbent pubescence only. Uniform dark brown, the legs lighter.

PARATYPE WORKERS. TL 2·8–3·2, HL 0·68–0·76, HW 0·65–0·70, CI 89–95, SL 0·52–0·57, SI 80–85, PW 0·48–0·53, AL 0·80–0·88 (17 measured). Maximum diameter of eye 0·11–0·14, about 0·17–0·20 × HW. As holotype but some with a pair of feeble rugulae flanking the median clypeal carina. 6–8 longitudinal rugulae between frontal carinae at eye level and some specimens with distinctly more cross-meshes on the cephalic dorsum than in the holotype. Propodeal spines usually feebly sinuate, most commonly ending with the apices upcurved.

Holotype worker, **Angola**: Salazar I.I.A.A., 9–15.iii.1972 (*P. M. Hammond*) (BMNH).

Paratypes. 17 workers with same data as holotype (BMNH; MCZ, Cambridge).

For relationships and separation of this species see under species-group discussion and under *pylacum*.

Tetramorium sigillum sp. n.

(Fig. 79)

Holotype worker. TL 2·9, HL 0·72, HW 0·62, CI 86, SL 0·58, SI 94, PW 0·45, AL 0·80.

Mandibles longitudinally striate. Anterior clypeal margin entire, without trace of a median notch or impression. Median clypeal carina strongly developed, the remaining clypeal sculpture consisting of a few weaker rugulae which arise posterolaterally on the clypeus and run anteriorly, converging on the median carina (not reaching the carina in some paratypes). Frontal carinae strong, running back almost to the occipital margin before merging with the rugose sculpture. Antennal scrobes shallow but conspicuous. Antennal scapes relatively long, SI > 90 in holotype (in paratype series SI 90–96). Maximum diameter of eye 0·12, about 0·19 × HW. Propodeal spines long and strong, very feebly downcurved along their length. Metapleural lobes elongate-triangular. Petiole node roughly rectangular in profile, in dorsal view longer than broad. Dorsum of head strongly longitudinally rugose, with five rugae between the frontal carinae at the level of the eyes. Occipital region with a weakly developed reticulum in which the longitudinal component predominates. Dorsal alitrunk rugose, mainly longitudinal but with a number of cross-meshes. Dorsal surfaces of the main rugae with a beaded appearance due to the presence of aligned minute punctures. Ground sculpture between rugae on head and alitrunk minimal and superficial, the surfaces glossy. Dorsum of petiole finely and quite densely rugulose but the postpetiole dorsum with a broad median longitudinal strip which is without rugular sculpture. In the holotype and most paratypes this strip has very feeble ground-sculpture which is almost effaced, but in a few it is shining. First gastral tergite unsculptured. All dorsal surfaces of head and body with numerous stout hairs which are blunted apically; the hind tibiae with short decumbent to appressed pubescence only. Colour dark brown, the gaster slightly lighter in shade than the alitrunk and head.

Paratype workers. TL 2·8–3·0, HL 0·68–0·72, HW 0·60–0·63, CI 86–88, SL 0·54–0·60, SI 90–96, PW 0·40–0·50, AL 0·74–0·88 (20 measured). Maximum diameter of eye 0·12–0·13, about 0·19–0·21 × HW. As holotype but some specimens blackish brown, the gaster usually lighter brown but sometimes almost as dark as the alitrunk. Propodeal spines vary from approximately straight to feebly sinuate; the majority show a slight downcurvature. On the clypeus 2–4 secondary rugulae converge on the median carina.

Holotype worker, **Ivory Coast**: Tai Forest, 9.viii.1975, no. 5 (*T. Diomande*) (BMNH).

Paratypes. 10 workers with same data as holotype; 12 workers with same locality data but 12.iii.1976, no. 3 (*T. Diomande*) (BMNH; MCZ, Cambridge; NM, Basle).

Non-paratypic material examined. **Ivory Coast**: Banco Forest, nr Abidjan (*W. L. Brown*).

In the *flabellum*-complex of species, to which *sigillum* belongs, this is the smallest representative and is quickly separable by the presence of an unsculptured median longitudinal strip on the postpetiole dorsum. This segment is evenly and conspicuously sculptured dorsally in the related species *ataxium, flabellum, geminatum* and *kestrum*.

The *simillimum*-group

(Figs 87–100)

Antennae with 12 segments. Sting appendage triangular or dentiform. Mandibles usually sculptured, rarely smooth. Anterior clypeal margin entire, without a median notch or impression. Frontal carinae varying from absent to strongly developed, with many intermediate stages. Antennal scrobes similarly variable. Eyes small to moderate (*simillimum*- and *poweri*-complexes) or large to very large (*oculatum*-complex). Antennal scapes with SI < 100 (usually < 90, rarely slightly greater). Propodeum usually armed with a pair of short triangular teeth or denticles which at most are only as long as the metapleural lobes, commonly shorter than them. In some propodeal armament is reduced to a pair of minute tubercles or merely an angle separating dorsum from declivity; never with elongate spines. Petiole narrowly nodiform in profile, in dorsal view as broad as or broader than long. Hairs on dorsal surfaces of alitrunk and first gastral tergite sparse, short stout and blunt apically, sometimes reduced in number or even absent (*arnoldi*) from dorsal alitrunk, but never with long fine acute hairs present on these surfaces. Middle and hind tibiae without long hairs of any description but usually with short appressed pubescence.

A large group, with 22 species endemic in the Ethiopian region and 2 other species found only in the Malagasy region. Two of the African species are very successful tramps (*caldarium* and *simillimum*) and have been widely distributed over the earth by human commerce. In the main their outdoor distribution is more or less restricted to the tropical and subtropical zones, but both are found fairly frequently in the temperate zones, associated with man and living in hothouses, zoos, or other constantly heated buildings.

Several of the species now recognized as valid in this group (and a number of their synonyms) were originally described as infraspecific forms of *T. caespitum*, the most common Palaearctic species of the genus. This association is now known to be incorrect and all African forms originally described as subspecies or varieties of *caespitum* are members of the *simillimum*-group with the sole exception of *nautarum*, known from a single (probably introduced) sample from Annobon I. which is a true *caespitum*-group member.

As presently constituted the *simillimum*-group is divisible into three complexes of related species centring respectively on those species related to *oculatum*, *simillimum* and *poweri*.

The *oculatum*-complex is characterized by large eyes where the maximum diameter is 0·29 × HW or more, and the longest row of facets contains 10 or more ommatidia. There are seven species thus isolated: *argenteopilosum*, *arnoldi*, *berbiculum*, *bevisi*, *krynitum*, *luteolum* and *oculatum*. Apart from the large eyes there is a tendency for 2–4 elongate curved, hooked or J-shaped hairs to be developed on the ventral surface of the head just behind the buccal cavity. The presence of these hairs has been confirmed in *berbiculum*, *krynitum*, *luteolum* and *oculatum*, and it is suspected that they are also present in the remaining three species of the complex. Unfortunately this cannot yet be confirmed as all presently available material of these 3 species is flat-mounted on card and the undersides obscured. Attempts to float them off their cards, without disturbing any ventral pilosity which may be present, have failed, most probably due to the age of the material. Fresh collections are therefore needed of *argenteopilosum*, *arnoldi* and *bevisi* to find if these long hairs are present.

In the *simillimum*-complex, containing the species *anxium*, *bothae*, *buthrum*, *delagoense*, *rhetidum* and *simillimum*, eyes are smaller than in the above complex, having a maximum diameter of 0·27 × HW at most (usually less), and having only 7–8 ommatidia in the longest row. Frontal carinae in this complex are continuous, strongly developed throughout their length, raised and often equipped with a narrow crest or flange above. The frontal carinae are always distinctly more strongly developed than the remaining cephalic sculpture. These strong frontal carinae are subtended by broad, conspicuous antennal scrobes which occupy most or all of the space between the carinae and the eyes on each side. The impressions which they form in the sides of the head run almost to the occipital corner. The complex may be divided up further as *anxium* and *buthrum* lack a dense reticulate-punctate ground-sculpture, which blankets the entire cephalic dorsum in the four remaining species.

In the *poweri*-complex, containing the remaining nine African species, the eyes fit the conditions given under *simillimum*-complex but the frontal carinae here are feeble, variously reduced or even absent. The complex contains the species *altivagans*, *caldarium*, *ghindanum*, *mossamedense*, *nefassitense*, *nigrum*, *pauper*, *poweri* and *pusillum*. In most of these the carinae are represented by a pair of fine, narrow lines which are not more strongly developed than the remaining cephalic sculpture and are not strongly raised. Commonly these carinae are broken or interrupted along their length or they tend to fade out posteriorly, becoming vestigial or vanishing behind the level of the eyes. In some the reduction is even more marked, the carinae ending at or in front of the eyes or lacking. Coupled with this reduction in the frontal carinae is a corresponding reduction in the development of the antennal scrobes which in this complex are at best vestigial, often absent.

In development of scrobes *mossamedense* forms a link between the *simillimum*-complex and the *poweri*-complex, the development being about midway between the two extremes. For this reason *mossamedense* is run out twice in the key, first among the relatives of *simillimum* and then among the allies of *poweri*.

The taxonomy of the *poweri*-complex is still unsatisfactory in places. The problem is one of lack or shortage of material and the complex will repay further investigation when better collections are available.

Tetramorium altivagans Santschi **stat. n.**

Tetramorium caespitum st. *altivagans* Santschi, 1914*b*: 103. Syntype workers, KENYA: Mt Kinangop, chaîne de l'Aberdare, 3100 m, st. no. 55, ii.1912 (*Alluaud & Jeannel*) (NM, Basle) [examined].

Tetramorium simillimum subsp. *isis* Weber, 1943: 373. Syntype workers, SUDAN: Imatong Mts, 8700 ft [2650 m], 28.vii.1939, no. 1350 (*N. A. Weber*) (MCZ, Cambridge; USNM, Washington) [examined]. **Syn. n.**

WORKER. TL 2·6–2·7, HL 0·60–0·64, HW 0·52–0·56, CI 84–88, SL 0·44–0·50, SI 84–91, PW 0·36–0·40, AL 0·68–0·72 (10 measured).

Mandibles longitudinally striate, usually coarsely and conspicuously so, less commonly with the striation finer but always distinct. Anterior clypeal margin entire, without trace of a median notch. Frontal carinae present but only weakly developed, no more strongly defined than the dorsal cephalic rugulae; always running back beyond the level of the eyes and generally approaching the occiput. In many the carinae are broken or interrupted along their length or their margins are irregular, and in some the real frontal carinae end abruptly and their function is taken over by one or more of the cephalic rugulae which curve out to replace the carina. Antennal scrobes vestigial, at most merely a feeble impression in the side of the head below the frontal carina. Maximum diameter of eye 0·12–0·14, about 0·24–0·25 × HW and with 7–9 ommatidia in the longest row. Propodeum armed with a pair of short triangular teeth which at most are as long as the metapleural lobes but are usually shorter. Petiole node in dorsal view broader than long. Dorsum of head finely and quite densely longitudinally rugulose, the ground-sculpture feeble and consisting only of light shagreening or very weak superficial punctulation, the surface glossy. Dorsal alitrunk finely and densely punctulate, this sculpture more strongly developed than on head, and usually with numerous fine rugulae. Petiole and postpetiole superficially punctulate, commonly one or both segments with vestigial rugular traces. First gastral tergite unsculptured or with a narrow band of fine shagreening basally. All dorsal surfaces of head and body with numerous short, stout blunt hairs. Colour dark brown to blackish brown.

An upland or mountain species of southern and eastern Africa, *altivagans* is distinguished from other members of the *poweri*-complex by its dark colour, size and relatively long scapes. Within the complex it is closest related to *pusillum* and *nigrum*. The first of these is easily separated by its possession of smooth mandibles, but the separation of *nigrum* rests on the relative development of the propodeal teeth and this may not be a good character as some variation is visible in the *altivagans* material presently available.

MATERIAL EXAMINED

Sudan: Imatong Mts (several series) (*N. A. Weber*). **Rhodesia**: Bulawayo (*G. Arnold*). **South Africa**: Drakensberg Mts, Klaserie (*E. S. Ross & R. E. Leech*).

Tetramorium anxium Santschi **stat. n.**

Tetramorium pusillum var. *anxia* Santschi, 1914*a*: 365, fig. 28. Syntype workers, female, GUINEA: Camayenne near Conakry (*F. Silvestri*) (NM, Basle) [examined].

WORKER. TL 2·0–2·2, HL 0·53–0·55, HW 0·46–0·49, CI 88–90, SL 0·39–0·40, SI 82–83, PW 0·34–0·36, AL 0·60–0·64 (3 measured).

Mandibles finely shagreened or punctulate, not longitudinally striate. Anterior clypeal margin entire, the median clypeal carina strong. Eyes moderate, maximum diameter *c.* 0·12, about 0·25 × HW, with 7–8 ommatidia in the greatest diameter. Frontal carinae strong, weakly sinuate, extending unbroken almost to occipital margin and markedly more strongly developed than any other longitudinal cephalic sculpture. Antennal scrobes broad and shallow, very distinct, less strongly sculptured than dorsum of head. Propodeal spines in profile a pair of short triangular teeth which are distinctly much shorter and narrower than the metapleural lobes, the latter broadly triangular. Petiole in profile with the dorsum of the node shorter than the height of the tergal portion, the anterior and posterior faces of the node slightly convergent dorsally. In dorsal view the node broader than long. Dorsum of head with feeble, scattered longitudinal rugulae. After the strong frontal carinae the most strongly developed component is the median cephalic carina which is stronger than any other longitudinal rugula. Surface of head with a very weak ground-sculpture, feebly shining. Dorsum of alitrunk with weak rugulae on the pronotum, the spaces between them smooth, virtually unsculptured. Posterior to this the rugulae becoming less conspicuous and the ground-sculpture more distinctly punctulate. Petiole and postpetiole punctulate, the first gastral tergite smooth, unsculptured.

Hairs present on all dorsal surfaces of head and body, universally short, stout and blunt. Appendages without hairs but with fairly dense short pubescence. Colour uniform blackish brown, the appendages yellowish brown.

Among the species of the *simillimum*-group in which the frontal carinae are strongly developed and which have conspicuous antennal scrobes only two species, *buthrum* and *anxium*, lack blanketing reticulate-punctate sculpture on the dorsum of the head. Of these two *buthrum* has the cephalic sculpture reduced to 5 weak longitudinal rugulae as opposed to 8–10 even more feeble rugulae in *anxium*. Coupled with this the ground-sculpture of the dorsum of the head is virtually absent in *buthrum* and it looks much more smooth and shiny than does the head of *anxium*.

Tetramorium argenteopilosum Arnold

(Figs 89, 90)

Tetramorium argenteopilosum Arnold, 1926: 261, fig. 71. Syntype workers, female, RHODESIA: Umgusa River, Sawmills, 23.xi.1918 (*G. Arnold*) (NM, Bulawayo; BMNH) [examined].

WORKER. TL 2·9–3·2, HL 0·70–0·78, HW 0·63–0·70, CI 87–92, SL 0·44–0·50, SI 69–74, PW 0·46–0·52, AL 0·80–0·90 (11 measured).

Mandibles finely longitudinally striate and glossy, the sculpture reduced in a few individuals but still easily visible. Anterior clypeal margin entire, without a median impression. Frontal carinae weakly developed, narrow, scarcely stronger than the longitudinal rugulae of the cephalic dorsum, extending back beyond the level of the posterior margins of the eyes but usually fading out before reaching the occipital margin. Antennal scrobes feeble, merely a shallow impression in the sides of the head below the frontal carinae. Eyes large, maximum diameter 0·18–0·21, about 0·29–0·31 × HW, with 10–12 ommatidia in the longest row. Metanotal groove strongly impressed in profile, the propodeal dorsum convex immediately behind the groove but then grading into a shallowly concave slope down to the propodeal teeth. Propodeum armed with a pair of short triangular teeth which are roughly as long as their basal width in profile. In dorsal view each tooth shorter than half the distance separating their bases. Metapleural lobes reduced to low rounded flanges. Petiole in profile a high, fairly narrow node, the dorsal length less than the height of the tergal portion. In dorsal view the node much broader than long. Dorsum of head finely longitudinally rugulose, with about 12–14 rugulae between the frontal carinae at the level of the eyes. Spaces between the rugulae blanketed by a dense reticulate-puncturation which is very conspicuous. Dorsal alitrunk densely and strongly reticulate-punctate, with a few feeble rugulae on the anterior pronotum. Dorsal surfaces of petiole and postpetiole, and base of first gastral tergite reticulate-punctate. All dorsal surfaces of head and body with numerous elongate, stout hairs which are blunt apically; hairs silvery and glittering, especially on gaster. Middle and hind tibiae only with short appressed fine pubescence. Colour dark brown to blackish brown.

Amongst the four dark-coloured species of the *oculatum*-complex *oculatum* itself is isolated by its enormous eyes (0·37–0·39 × HW as opposed to 0·29–0·31 × HW in the three other species). In *bevisi* and *krynitum* the base of the first gastral tergite is unsculptured and the hairs on the tergite are not silvery and glittering, whereas in *argenteopilosum* gastral sculpture is very distinctive and the thick silvery hairs conspicuous. Finally, in both *bevisi* and *krynitum* the entirety of the promesonotum has rugular sculpture present whereas in *argenteopilosum* rugulae are restricted to the anterior pronotum, the remainder of the alitrunk being without them and strongly reticulate-punctate.

MATERIAL EXAMINED

Rhodesia: Victoria Falls (*G. Arnold*); Sawmills (*G. Arnold*).

Tetramorium arnoldi (Santschi)

(Fig. 91)

Rhoptromyrmex arnoldi Santschi, 1916*a*: 503. Syntype workers, RHODESIA: Victoria Falls, xii.1914 (*G. Arnold*) (BMNH; NM, Basle; MCZ, Cambridge) [examined].

Tetramorium arnoldi (Santschi); Santschi, 1917: 286 [in text].

Tetramorium incruentatum Arnold, 1926: 271. [Unnecessary replacement name.]

WORKER. TL 2·8–3·0, HL 0·66–0·70, HW 0·57–0·65, CI 89–94, SL 0·41–0·45, SI 68–72, PW 0·40–0·46, AL 0·72–0·78 (10 measured).

Mandibles longitudinally striate. Anterior clypeal margin entire, without a trace of a median notch or impression. Frontal carinae variable but very feebly developed, in some specimens merely a narrow ridge which is no more strongly developed than the cephalic rugulae and which sometimes runs back beyond the level of the eyes. In others the carinae are broken or disjointed, or fade out posteriorly, and in some they are absent or absolutely indistinguishable from the remaining cephalic sculpture; most of these variations are visible in any single nest-sample. Antennal scrobes vestigial to absent. Eyes situated at about the midlength of the sides of the head, maximum diameter 0·18–0·19, about 0·29–0·32 × HW and with 10–11 ommatidia in the longest row. Metanotal groove impressed in profile. Propodeum unarmed, rounded or at most with feebly prominent angles, without differentiated teeth. Metapleural lobes rounded. Petiole in profile high and fairly narrow, the height of the tergal portion of the node slightly greater than the dorsal length. In dorsal view the node slightly broader than long, narrowly rounded in front and much broader behind than in front. Dorsum of head longitudinally rugulose with a fine reticulate-punctate ground-sculpture. Dorsal alitrunk finely and densely reticulate-punctulate and dull, the pronotum and sometimes also the mesonotum with weak longitudinal rugulae. Petiole and postpetiole dorsally extremely finely punctulate or granular, base of first gastral tergite finely and faintly granular or shagreened. Short, stout hairs fairly numerous and conspicuous on gaster and postpetiole, more scattered and shorter on head but completely absent from dorsal alitrunk and petiole node. Colour uniform clear pale yellow.

Easily distinguished from its relatives in this group by its combination of pale yellow colour, lack of hairs on the dorsal alitrunk and unarmed or merely angular propodeum, *arnoldi* is one of the most distinctive members of the *oculatum*-complex. Three yellow species are known in this complex and *arnoldi* is separated from them by the characters just noted. In *berbiculum* the propodeum lacks teeth as is the case in *arnoldi*, but this species has hairs present on the alitrunk and longer antennal scapes, SI 77–80 as opposed to SI 68–72 in *arnoldi*.

MATERIAL EXAMINED

Rhodesia: Redbank (*G. Arnold*); Sawmills (*G. Arnold*); Bembesi Riv. Valley (*G. Arnold*).

Tetramorium berbiculum sp. n.

(Fig. 92)

HOLOTYPE WORKER. TL 2·9, HL 0·68, HW 0·59, CI 87, SL 0·46, SI 78, PW 0·44, AL 0·78.

Mandibles finely longitudinally striate. Anterior clypeal margin entire, without a median notch or impression. Frontal carinae very feebly developed, ending close to level of posterior margins of eyes where they fade out or are broken. (In paratypes extending beyond level of eyes but in entire type-series the carinae no more strongly developed than the remaining cephalic rugulae.) Antennal scrobes vestigial, merely a very weak shallow impression in the sides of the head. Eyes situated very slightly behind the midlength of the sides, maximum diameter 0·18, about 0·30 × HW and with 11–12 ommatidia in the longest row. Metanotal groove slightly impressed in profile. Propodeum unarmed, the dorsum meeting the declivity in a blunt angle or very low blunt prominence, without differentiated teeth. Metapleural lobes prominent but low and rounded apically. Petiole node in profile with the dorsal surface sloping downwards posteriorly so that the anterior face of the node is distinctly longer than the posterior. Dorsal length of node equal to or slightly greater than the height of the tergal portion. In dorsal view the petiole node about as broad as long, rounded, without sharp margins or angles. Dorsum of head finely and irregularly longitudinally rugulose, with a dense blanketing reticulate-punctate ground-sculpture which is very conspicuous. Dorsal alitrunk finely reticulate-punctate with the faintest vestiges of rugular sculpture on the pronotum, almost effaced. Petiole and postpetiole exceedingly finely and shallowly punctulate, with a granular appearance. Base of first gastral tergite superficially shagreened. Stout, blunt, short hairs conspicuous on first gastral tergite and postpetiole, more sparse and shorter on head, promesonotum and petiole, absent from propodeum. Ventral surface of head with several elongate finer hairs situated just posterior to the buccal cavity which are hooked or J-shaped. Middle and hind tibiae with minute decumbent pubescence. Colour uniform pale yellow.

PARATYPE WORKERS. TL 2·8–2·9, HL 0·70, HW 0·60, CI 86, SL 0·46–0·48, SI 77–80, PW 0·46, AL 0·80–0·82 (2 measured). Maximum diameter of eye 0·18–0·19, about 0·30–0·32 × HW; otherwise as holotype.

Holotype worker, **Rhodesia**: Nyamandhlovu, 27.xi.1960, Nat. Mus. S. Rhodesia (*G. Arnold*) (NM, Bulawayo).

Paratypes. 3 workers with same data as holotype (one with head missing) (NM, Bulawayo; BMNH).

Of the three yellow species in the *oculatum*-complex of this group two, *arnoldi* and *berbiculum*, have the propodeum unarmed. The third species, *luteolum*, has small but well-developed propodeal teeth. The differences separating *arnoldi* and *berbiculum* are tabulated as follows.

arnoldi	*berbiculum*
Hairs absent from dorsal alitrunk.	Hairs present on dorsal alitrunk.
Antennal scapes shorter, SI 68–72.	Antennal scapes longer, SI 77–80.
Petiole node less massive in profile, shaped as in Fig. 91.	Petiole node more massive in profile, shaped as in Fig. 92.
Petiole node in dorsal view broader than long.	Petiole node in dorsal view about as long as broad.
Head somewhat broader, CI 89–94.	Head somewhat narrower, CI 86–87.

Tetramorium bevisi Arnold

(Fig. 95)

Tetramorium bevisi Arnold, 1958: 120, figs 1, 1a. Syntype workers, females, males, LESOTHO: Molepi Stream, 40 miles [64 km] E. of Maseru, 8400 ft [2560 m], 6.iii.56 (*I. Bevis*) (BMNH; NM, Bulawayo) [examined].

WORKER. TL 2·8–3·0, HL 0·66–0·70, HW 0·58–0·61, CI 86–88, SL 0·48–0·52, SI 80–87, PW 0·42–0·44, AL 0·78–0·82 (5 measured).

Mandibles longitudinally striate. Anterior clypeal margin entire, without a median notch or impression. Frontal carinae weak, no more strongly developed than the longitudinal rugulae of the cephalic dorsum, but extending back beyond the level of the posterior margins of the eyes before fading out. Antennal scrobes vestigial, no more than an exceedingly feeble impression in the sides of the head below the frontal carinae. Maximum diameter of eye 0·18, about 0·29–0·31 × HW and with 10 ommatidia in the longest row. With the alitrunk in profile the metanotal groove feebly indented. Propodeum armed with a pair of short triangular teeth. Metapleural lobes triangular and low, about as long as the propodeal teeth. Petiole in profile with the dorsal length less than the height of the tergal portion, the node narrowing slightly from base to apex and with the posterodorsal angle rounded, less sharply defined than the anterodorsal. Node in dorsal view distinctly broader than long. Dorsum of head finely longitudinally rugulose with faint punctulate ground-sculpture. Dorsal alitrunk predominantly finely punctulate but with faint or vestigial longitudinal rugulae on the promesonotum. Dorsal surfaces of petiole and postpetiole with superficial, very faint punctulation or shagreening. First gastral tergite unsculptured. All dorsal surfaces of head and body with numerous stout hairs, erect or suberect, those on the alitrunk distinctly blunt apically. Colour dark brown.

A fairly distinctive species in the *oculatum*-complex, characterized by its lack of gastral sculpture, dark colour, moderately sized eyes, triangular metapleural lobes and lack of glittering silvery gastral hairs. Its closest relatives are *oculatum* in which the eyes are enormous (0·37–0·39 × HW), *argenteopilosum* in which the gaster has strong basal puncturation and silvery hairs, and *krynitum*. The last-named is probably the closest known relative of *bevisi*, but the two may be separated as follows.

bevisi	*krynitum*
Metapleural lobes triangular.	Metapleural lobes bluntly rounded.
Promesonotum with scattered vestigial rugulae.	Promesonotum with weak but continuous rugulae.
Metanotal groove feebly indented.	Metanotal groove strongly impressed.
Head narrower (CI 86–88).	Head broader (CI 91).
Scapes relatively longer (SI 80–87).	Scapes relatively shorter (SI 71).
Petiole node in profile narrowing from base to apex.	Petiole node in profile not narrowing from base to apex.

Tetramorium bothae Forel **stat. n.**

Tetramorium simillimum subsp. *bothae* Forel, 1910*b*: 425. Syntype workers, female, male, SOUTH AFRICA: Natal (*Haviland*); and Natal and Lesotho (= Basutoland) (*Wroughton*) (MHN, Geneva) [examined].
Tetramorium guillarmodi Arnold, 1960*a*: 454, figs 4, 4a. Syntype workers, female, LESOTHO ('Basutoland'): Mamathes, x.1957 (*C. Jacot-Guillarmod*). (BMNH; NM, Bulawayo) [examined]. **Syn. n.**

WORKER. TL 2·4–2·6, HL 0·58–0·60, HW 0·50–0·54, CI 86–90, SL 0·38–0·42, SI 76–81, PW 0·34–0·40, AL 0·64–0·68 (10 measured).

Mandibles smooth and shining when clean but some specimens with a waxy coating on the surfaces of the mandibles which gives them an irregular dull appearance. Anterior clypeal margin entire, evenly arcuate, without trace of a median notch or impression. Frontal carinae strongly developed, running back unbroken almost to the occiput. Maximum separation of the carinae at eye level 0·26–0·28, about 0·52–0·54 × HW. Antennal scrobes strongly developed and conspicuous, forming a wide concave area below the frontal carina and above the eye on each side of the head and extending back almost to the occipital corner. Eyes with 7–8 ommatidia in the longest row, the maximum eye diameter 0·13–0·14, about 0·24–0·27 × HW. Propodeum armed with a pair of short triangular teeth which vary from shorter than the metapleural lobes to about equal to their length. Petiole in profile a high and fairly narrow node, which in dorsal view is distinctly broader than long. Dorsum of head with irregular fine longitudinal rugulae which are fairly dense, usually 12–14 between the frontal carinae at eye level. These rugulae are superimposed on a coarse granular or reticulate-punctate ground-sculpture which is very conspicuous and blankets the entire dorsum. Scrobal area densely and strongly reticulate-punctate, without rugular sculpture such as is present on the dorsum. Dorsal surfaces of alitrunk and pedicel segments reticulate-punctate, the former also usually with a few faint longitudinal rugulae, but the number and intensity of these rugulae varying within a single series. First gastral tergite smooth or at most with a vestigial superficial reticular pattern at the extreme base. All dorsal surfaces of the head and body with sparse short stout blunt hairs, those on the head and alitrunk behind the anterior pronotum generally distinctly shorter than those on the first gastral tergite. Middle and hind tibiae only with minute appressed pubescence. Colour uniform dark brown to blackish brown, the appendages lighter, yellowish brown.

This small, apparently uncommon species is the closest known relative of *simillimum* and is separable from it by its uniform dark colour (yellow-brown or bicoloured in *simillimum*) and the fact that the mandibles in *bothae* are smooth whilst those of *simillimum* are sculptured. Other close relatives in the *simillimum*-complex of this group include *delagoense* and *rhetidum*, the four together being characterized by a dense blanketing reticulate-punctulate or granular cephalic ground-sculpture which separates them from the remaining members of the complex (*anxium* and *buthrum*) where cephalic ground-sculpture is feeble or absent. *T. delagoense* is separated from *bothae* by its possession of a single stiff hair projecting from the sides of head immediately behind the eye (absent in *bothae*) and by the fact that the antennal scapes are longer in *delagoense*, SI 84–92 as opposed to SI 76–81 in *bothae*. Characters separating *bothae* from the smaller, bright yellow *rhetidum* are tabulated under the latter species.

On present evidence there is no doubt that *bothae* and *simillimum* represent separate although closely related species. The colour character alone is not convincing evidence as some populations of *simillimum* have the gaster very dark brown, particularly in West African countries, and these may be regarded as intermediate between the light yellowish or yellow-brown usually seen in *simillimum* and the darker colour of *bothae*. However, no populations of *simillimum* are known in which the mandibles are unsculptured and thus I feel that the two forms are best regarded as distinct, at least until further samples of *bothae* can be obtained.

Tetramorium buthrum **sp. n.**

HOLOTYPE WORKER. TL 2·2, HL 0·52, HW 0·44, CI 85, SL 0·40, SI 91, PW 0·32, AL 0·57.

Mandibles finely shagreened. Anterior clypeal margin entire, without a median impression, regularly arcuate and with the median carina strongly developed. Frontal carinae reaching back almost to occipital margin, strongly developed, obviously more robust than any other cephalic sculpture and feebly elevated throughout their length; maximum separation of frontal carinae at level of eyes 0·24, *c.* 0·55 × HW. Antennal scrobes conspicuous, forming a shallow concavity in the side of the head which occupies all the space between the frontal carina and the eye on each side and which extends back almost to the occipital corner. Antennal scapes relatively long for a member of this group, SI 90 or more in all members of type-series (a figure not usually attained in *simillimum*-group members). Maximum diameter of eye 0·11, about 0·25 × HW and with 6–7 ommatidia in the longest row. Propodeum armed with a pair of short triangular teeth which are slightly shorter and distinctly narrower than the metapleural lobes. Petiole in dorsal view slightly broader than long. Dorsum of head feebly sculptured, with only 5 weak longitudinal rugulae of which 3 are relatively more strongly developed than the other 2, which are exceedingly weak. Ground-sculpture of dorsal head vestigial, no more than a slight roughening of the surface, the area glossy. Scrobal areas of sides of head glossy, with only vestigial ground-sculpture. Dorsal surfaces of alitrunk, petiole and postpetiole unsculptured except for scattered faint superficial punctulae. First gastral tergite unsculptured. All dorsal surfaces of head and body with scattered short, stout, blunt hairs which are more or less straight. Tibiae of middle and hind legs only with short, fine appressed pubescence. Colour dark brown, glossy; appendages lighter, yellowish brown.

PARATYPE WORKERS. TL 2·2–2·3, HL 0·52–0·54, HW 0·44–0·48, CI 85–89, SL 0·40–0·43, SI 90–93, PW 0·32–0·35, AL 0·57–0·64 (4 measured). Maximum diameter of eye 0·11–0·12, about 0·25–0·26 × HW. Maximum separation of frontal carinae at level of eyes 0·23–0·26, about 0·52–0·55 × HW. As holotype but in some with another pair of cephalic rugulae visible which are, however, very feeble indeed. One or two faint longitudinal rugulae may be present on the pronotal dorsum and the mandibles vary from lightly shagreened to more or less smooth.

Holotype worker, **Central African Empire** ('Fr. Equat. Afr., Ubangi-Shari' on data label): Haut Mbomu, iii.1948, no. 2188 (*N. A. Weber*) (MCZ, Cambridge).

Paratypes. **Central African Empire**: 2 workers with same data as holotype. **Zaire** ('B. Congo' on data label): 2 workers, Niangara, ii–iii.1948, no. 2157 (*N. A. Weber*). (MCZ, Cambridge; BMNH.)

In the *simillimum*-complex of this group the six species constituting the complex are characterized by their possession of strongly developed frontal carinae and antennal scrobes. Of the six, four have a very strong blanketing reticulate-punctate ground-sculpture on the head and elsewhere, but this is absent in the two species *anxium* and *buthrum*. The two species are separated by the relative lengths of the scapes (SI 82–83 in *anxium*, 90–93 in *buthrum*) and by the fact that the dorsum of the head is more densely rugulose in *anxium*, there being 8–10 feeble rugulae between the frontal carinae at eye level as opposed to 5 in *buthrum*.

Tetramorium caldarium (Roger)

Tetrogmus caldarius Roger, 1857: 12. Syntype worker, GERMANY: Prussia, 'Ananashause in Rauden' (BMNH) [examined].

[*Tetramorium simillimum* (F. Smith); Roger, 1862: 297. Erroneous synonymy; *T. caldarium* restored as valid species by Bolton, 1979: 169.]

Tetramorium pauper st. *transformans* Santschi, 1914*b*: 104. Holotype worker, KENYA: Shimoni, st. no. 9, xi.1911 (*Alluaud & Jeannel*) (NM, Basle) [examined]. **Syn. n.**

Tetramorium pusillum var. *hemisi* Wheeler, 1922: 193. Syntype workers, ZAIRE: Niangara, stomach of frog (*Hemisus marmoratum*) (*H. O. Lang*) (MCZ, Cambridge) [examined]. [Synonymy by Bolton, 1979: 169.]

Tetramorium antipodum Wheeler, 1927: 143. Syntype workers, NORFOLK I.: 1915 (*A. M. Lea*) (MCZ, Cambridge) [examined]. [Synonymy by Bolton, 1979: 169.]

Tetramorium minutum Donisthorpe, 1942: 30. Holotype female, EGYPT: Siwa, 17.vii.1935 (*J. Omer-Cooper*) (BMNH) [examined]. [Synonymy by Bolton, 1979: 169.]

WORKER. TL 2·1–2·4, HL 0·52–0·58, HW 0·44–0·50, CI 85–90, SL 0·36–0·42, SI 79–87, PW 0·30–0·38, AL 0·56–0·64 (25 measured).

Mandibles finely and quite gently longitudinally striate or weakly shagreened, sometimes with traces of both, generally glossy. Anterior clypeal margin entire, without trace of a median notch. Frontal carinae present, running back beyond the level of the eyes but always feebly developed throughout their length and weaker behind the eyes than in front; commonly fading out or becoming fragmental or interrupted before reaching the occipital region where they disappear or become indistinguishable from the remaining cephalic sculpture. Antennal scrobes feeble or vestigial, very little concave and indistinct. Maximum diameter of eye 0·11–0·13, about 0·25–0·27 × HW and with 7–8 ommatidia in the longest row. Propodeum in profile armed with a pair of small triangular teeth which are shorter and narrower than the metapleural lobes. Petiole node in dorsal view broader than long. Dorsum of head finely weakly longitudinally rugulose, the individual rugulae poorly developed, low and sometimes inconspicuous. Ground-sculpture present but feeble, at most a superficial granulation or punctulation. Dorsal alitrunk with superficial punctulate or granular ground-sculpture, usually overlaid by a few fine weak rugulae, but sometimes these are very reduced or to a large extent suppressed. Petiole and postpetiole finely granular dorsally, sometimes with one or two very weak rugulae present. First gastral tergite unsculptured or the base with a band of weak shagreening. Short, stout blunt hairs present on all dorsal surfaces of the head and body but the tibiae only with minute appressed pubescence. Colour yellow or light yellowish brown, the gaster usually darker in shade than the head and alitrunk.

For many years *caldarium* was treated as a junior synonym of *simillimum*, but recently it was realized (Bolton, 1979) that it stands as a good species in its own right, with the synonyms listed above. Like *simillimum* it is a tramp species of African origin but does not appear to be quite as successful as that species as collections of *caldarium* are encountered far less frequently than those of *simillimum*.

It should be stated at this point that I suspect two species may be present in the taxon *caldarium* as presently constituted. I have noticed that the separation of the frontal carinae at eye level differs in different populations. In most the maximum separation of the carinae at eye level exceeds 0·50 × HW. This includes all New World material, the vast majority of Old World specimens, and the type-material of *caldarium, hemisi* and *minutum*. However, in the types of *transformans* and *antipodum* and in a few specimens from Kenya and India the separation of the carinae is $< 0{\cdot}50 \times$ HW. Whether this is significant remains to be seen as far too little material of the latter group is presently available for an accurate decision to be made.

Material examined (Old World; for known New World distribution see Bolton, 1979)

India: Rajastan, Jaipur (*E. S. Ross & D. Cavagnaro*). **Mauritius**: Rose Hill (*R. Mamet*). **Madeira**: ex coll. F. Smith; Deserta Grande (*Lindberg*); Canical (*Lindberg*). **Cape Verde Is.**: S. Antão Pombas (*Lindberg*); Fogo R., Fonte Galinha (*Lindberg*). **Great Britain**: England, Kew Gardens (*E. Saunders*). **New Caledonia**: (*N. L. H. Krauss*). **Egypt**: Port Said (*E. O. Wilson*). **Sudan**: Imatong Mts (*N. A. Weber*); Equatoria, Kagelu (*N. A. Weber*). **Kenya**: Diani Beach (*N. L. H. Krauss*); no loc. (*N. A. Weber*). **Ivory Coast**: Orstom Exp. Sta. (*W. L. Brown*). **Nigeria**: Mokwa (*B. Lasebikan*). **St Helena I.** (*A. Loveridge*).

Tetramorium delagoense Forel

(Fig. 98)

Tetramorium simillimum st. *delagoense* Forel, 1894, 80. Syntype workers, females, males, Mozambique: Delagoa (*Liengme*) (MHN, Geneva) [examined].

Tetramorium simillimum var. *madecassum* Forel, 1895: 248. Holotype worker, Madagascar: Imerina (*Sikora*) (MHN, Geneva) [examined]. [Synonymy by Bolton, 1979: 156.]

Tetramorium intextum Santschi, 1914*b*: 104, fig. 14. Holotype worker, Kenya: Kikuyu Terr., Blue Post Hotel, 1520 m, st. no. 29., i.1912 (*Alluaud & Jeannel*) (NM, Basle) [examined]. **Syn. n.**

Tetramorium intextum var. *cataractae* Santschi, 1916*a*: 506, fig. Syntype workers, Rhodesia: Victoria Falls, xii.1914 (*G. Arnold*) (NM, Basle; BMNH) [examined]. **Syn. n.**

Tetramorium zambezium Santschi, 1939: 244. Syntype workers, Rhodesia: Victoria Falls, ix.1917 (*G. Arnold*) (NM, Basle; BMNH; NM, Bulawayo) [examined]. **Syn. n.**

Tetramorium delagoense Forel; Bolton, 1979: 156. [Raised to species.]

Worker. TL 2·1–2·9, HL 0·52–0·68, HW 0·44–0·56, CI 83–90, SL 0·36–0·54, SI 84–92, PW 0·32–0·44, AL 0·58–0·80 (60 measured).

Mandibles finely sculptured with dense weak striation or dense shagreening. Anterior clypeal margin entire, without trace of a median notch or impression. Frontal carinae strongly developed, running unbroken almost to the occipital margin, as strongly or more strongly developed than the remaining cephalic sculpture. Maximum separation of frontal carinae at eye level 0·24–0·32, about 0·50–0·58 × HW. Antennal scrobes conspicuous, forming a concavity in the side of the head between the frontal carina and the eye on each side, and extending back almost to the occipital corner. Maximum diameter of eye 0·12–0·14, about 0·24–0·27 × HW and with 7–8 ommatidia in the longest row. Propodeum armed with a pair of short triangular teeth which at most are as long as the metapleural lobes but are usually shorter and always narrower than them. Petiole in dorsal view broader than long. Dorsum of head finely and quite densely irregularly longitudinally rugulose and with a dense reticulate-punctate or granulate ground-sculpture. Scrobal areas densely reticulate-punctate, without rugular sculpture or at most with one or two fine rugulae immediately above and very close to the eye. Dorsal alitrunk with irregular and usually weak scattered rugulae superimposed upon a reticulate-punctulate or granular ground-sculpture. Petiole and postpetiole reticulate-punctulate or granular, usually without rugulae but sometimes with one or two present. First gastral tergite unsculptured or at most with a narrow band of weak shagreening basally. All dorsal surfaces of head and body with short, stout, blunt, more or less straight hairs. With the head in full-face view the sides immediately behind the eyes with a single stout hair which projects freely beyond the outline of the sides and is directed anteriorly. Tibiae of middle and hind legs with short pubescence which is decumbent or appressed. Colour variable, all shades between yellowish brown and black.

Within the *simillimum*-complex of this group *delagoense* is closest related to *simillimum, rhetidum* and *bothae* by the possession of dense reticulate-punctate or granular ground-sculpture on the head and elsewhere. It is quickly separable from these related forms by its possession of a single stiff hair which projects from each side of the head immediately behind the eye on each side, this character being absent in all three of the close relatives of *delagoense*.

The five names given in the synonymy above are being treated here as a single taxon on the strength of the following characters in combination (within the limits given for the species-group as a whole): frontal carinae long and strongly developed, antennal scrobes conspicuous, cephalic ground-sculpture dense and strong, sides of head with a projecting stout hair behind the eyes. This is the best that can be done at present, but I strongly suspect that two or even three species may in fact be included in this aggregate. There is considerable variation in colour, density and intensity of rugular sculpture, shape of various parts of the body (petiole for instance) and size between different populations, but as yet there is no way of dividing the mass into separate species other than by drawing purely imaginary lines.

The solution to the problem will have to await the amassing of more material than is now available but one point in the variation can be raised, that of colour. In general material from southern and eastern Africa is yellowish brown or light brown, whilst specimens from the forested zones of west and central Africa are black or blackish brown. I do not know if this is significant or purely a response to the environment but I suspect the latter as specimens from the spray forest at Victoria Falls tend to be darker than other Rhodesian samples.

MATERIAL EXAMINED

Sudan: Imatong Mts (*N. A. Weber*); Khor Aba (*N. A. Weber*); Lotti Forest (*N. A. Weber*). **Uganda**: Ft Portal (*N. A. Weber*). **Kenya**: Nakuru (*E. S. Ross & R. E. Leech*); no loc. (*N. A. Weber*). **Ivory Coast**: Lamto (*Gotwald & Schaefer*). **Ghana**: Mampong (*P. M. Room*); Aburi (*D. Leston*); Tafo (*B. Bolton*). **Nigeria**: Gambari (*B. Bolton*); Gambari (*B. Taylor*); Ile-Ife (*J. Medler*); Ibadan (*B. Critchley*). **Angola**: Dundo (*L. de Carvalho*); Salazar (*P. Hammond*). **Rhodesia**: Vumba Mts (*G. Arnold*); Vumba Mts (*W. L. Brown*); Umtali (*G. Arnold*); Umtali (*W. L. Brown*); Victoria Falls (*W. L. Brown*). **South Africa**: Natal, Durban (*G. Arnold*); Durban (*C. B. Cooper*); Umkomaas Riv. Game Farm (*W. L. & D. E. Brown*); Cape Prov., Zuurberg (*J. Hewitt*); Pt Elizabeth (*B. Brunhuber*); Alexandria For. Res. (*W. L. Brown & L. Weatherill*); Walmer (*W. L. Brown*).

Tetramorium ghindanum Forel **stat. n.**

(Fig. 100)

Tetramorium caespitum subsp. *ghindanum* Forel, 1910*c*: 260. Syntype workers, ETHIOPIA: Ghinda, iii.1906 (*K. Escherich*) (MHN, Geneva; BMNH; MCZ, Cambridge; USNM, Washington) [examined].

WORKER. TL 2·2–2·3, HL 0·58–0·60, HW 0·48–0·50, CI 83–84, SL 0·42–0·45, SI 86–90, PW 0·34–0·36, AL 0·60–0·64 (5 measured).

Mandibles finely and delicately longitudinally striate, the striation sometimes inconspicuous. Anterior clypeal margin without a median notch or impression, the median clypeal carina distinct. Frontal carinae narrow and weakly developed, usually ending at or just behind the level of the midlength of the eye. Rarely the frontal carinae extend slightly beyond the level of the eyes but in most this is an illusion as the real carinae end but their place is taken by one of the cephalic rugulae; in such cases there is always a gap between the end of the carina proper and the rugula which arises internal to it. Antennal scrobes absent. Eyes of moderate size, maximum diameter *c.* 0·12, about 0·24 × HW, with 7 ommatidia in the longest row. Propodeum armed with a pair of short triangular teeth which at most are only as long as the metapleural lobes, usually shorter than them. Petiole node in dorsal view broader than long. Dorsum of head finely but quite strongly longitudinally rugulose and with a conspicuous densely punctulate or granular ground-sculpture. Dorsal alitrunk with numerous fine rugulae which form a disorganized reticulum in places and with a blanketing densely punctulate ground-sculpture. Petiole and postpetiole with similar sculpture but the rugulae fainter. First gastral tergite densely sculptured at least on basal half, often the entire sclerite involved but here the markings are distinctly weaker on the posterior half of the segment. The sculpture consists of coarse shagreening or very fine punctulation, sometimes aligned to give the effect of exceptionally fine dense costulation. All dorsal surfaces of head and body with short, stout blunt hairs. With the head in full-face view the sides behind the eyes each with two freely projecting stout hairs. Colour yellowish brown.

One of the two species of the group known at present only from Ethiopia (and only from the type-series), *ghindanum* is closest related to *nefassitense*, the two together being isolated by the strong sculpture which they possess on the basal half of the first gastral tergite. The two are quickly separated as *ghindanum* has hairs projecting from the side of the head behind the eyes, absent in *nefassitense*, and the eyes of *ghindanum* are smaller.

***Tetramorium krynitum* sp. n.**

(Fig. 94)

HOLOTYPE WORKER. TL 2·7, HL 0·68, HW 0·62, CI 91, SL 0·44, SI 71, PW 0·44, AL 0·78.

Mandibles longitudinally striate. Anterior clypeal margin entire, without trace of a median impression. Frontal carinae extending back beyond the level of the posterior margins of the eyes but only feebly developed, no stronger than the longitudinal cephalic rugulae which run between them. Antennal scrobes vestigial, represented only by a very weak impression in the sides of the head below the frontal carinae. Maximum diameter of eye 0·19, about 0·31 × HW. With alitrunk in profile the metanotal groove distinctly impressed. Propodeum armed with a pair of short triangular teeth. Metapleural lobes rounded. Petiole in profile with the dorsal surface shorter than the height of the tergal portion of the node, the anterior and posterior faces of the node more or less parallel so that the node is about the same thickness throughout its height, not narrowing from base to apex. Petiole in dorsal view with the node distinctly broader than long. Dorsum of head finely longitudinally rugulose, with 11–12 rugulae between the frontal carinae at eye level. Spaces between the rugulae with fine but quite conspicuous punctulate ground-sculpture. Dorsal alitrunk with reticulate-punctate sculpture on the propodeum, but this is suppressed and faint on the promesonotum where it forms a weak ground-sculpture overlaid by a series of continuous longitudinal fine rugulae, without cross-meshes. Dorsal surfaces of petiole and postpetiole very finely superficially punctulate or shagreened, the first gastral tergite unsculptured. All dorsal surfaces of head and body with numerous stout hairs, those on the alitrunk conspicuously blunted apically. Colour dark brown.

Holotype worker, **South West Africa**: Okahanja, 7.iv.1972 (*P. M. Hammond*) (BMNH).

T. krynitum is one of the four species of the *oculatum*-complex in which long hooked or J-shaped hairs are present on the ventral surface of the head just posterior to the buccal cavity. Among its darkly coloured relatives in the complex such hairs are also known in *oculatum* but have not been confirmed in either *bevisi* or *argenteopilosum* through lack of suitably mounted material. Characters separating *krynitum* from *bevisi* are tabulated under the latter species. The other darkly coloured members of the complex are separated by the very large eyes of *oculatum* (0·37–0·39 × HW) and by the presence in *argenteopilosum* of glittering silvery gastral hairs and a strongly punctulate base to the first gastral tergite.

***Tetramorium luteolum* Arnold stat. n.**

(Fig. 93)

Tetramorium incruentatum var. *luteolum* Arnold, 1926: 272, fig. 77. Syntype workers, RHODESIA: Nyamandhlovu, 15.xii.1915 (*G. Arnold*) (BMNH) [examined].

WORKER. TL 2·5–2·7, HL 0·62–0·64, HW 0·56–0·58, CI 89–94, SL 0·40–0·44, SI 71–76, PW 0·38–0·42, AL 0·66–0·72 (10 measured).

Mandibles longitudinally striate. Anterior clypeal margin entire, without a median impression or notch. Frontal carinae feeble, not more strongly developed than the longitudinal cephalic rugulae; variable in length. Usually the weak, narrow frontal carinae extend beyond the level of the posterior margins of the eyes but sometimes they are interrupted or broken, or fade out just behind eye-level, becoming indistinguishable from the other sculpture. Less commonly the carinae end at the level of the mid-length of the eyes; considerable variation is present in a single nest-series. Antennal scrobes vestigial. Maximum diameter of eye 0·17–0·18, about 0·30–0·31 × HW and usually with 10–11 ommatidia in the longest row. Metanotal groove distinctly impressed in profile. Propodeum armed with a pair of stout short teeth which are sometimes blunt apically. Metapleural lobes rounded. Petiole in profile with the height of the tergal portion greater than the dorsal length of the node; in dorsal view the petiole node much broader than long. Dorsum of head with spaced out longitudinal rugulae, the spaces between them with only a faint superficial punctulation or weakly granular appearance, lacking the conspicuous reticulate-punctate blanket seen in related species. Dorsal alitrunk feebly punctulate-granular, the pronotum commonly with a few vestigial rugulae which may extend onto the anterior portion of the mesonotum. Dorsal surfaces of petiole and postpetiole very feebly superficially punctulate or shagreened. Base of first gastral tergite shallowly and lightly shagreened with superimposed larger punctures from which hairs arise. All dorsal surfaces of head and body except propodeum with projecting short, stout, blunted hairs. Colour pale yellow, the gaster usually slightly darker than the head and alitrunk.

Of the three yellow species in the large-eyed *oculatum*-complex of this group *luteolum* is easily distinguished from the other two by the presence of propodeal teeth. It is one of the four species of the complex in which the presence of elongate curved or J-shaped hairs on the ventral surface of the head behind the buccal cavity has been confirmed. (The others are *berbiculum*, *krynitum* and *oculatum*, see under species-group discussion.)

MATERIAL EXAMINED

Rhodesia: Sawmills (*G. Arnold*).

Tetramorium mossamedense Forel **stat. n.**

Tetramorium caespitum var. *mossamedensis* Forel, 1901: 306. Syntype workers, ANGOLA: Mossamedes, Cubango-Cuito (MHN, Geneva) [examined].

Tetramorium caespitum subsp. *schultzei* Forel, 1910*a*: 19. Syntype workers, SOUTH WEST AFRICA: Kalahari, Kgokong-Kang (*Schultze*) (types not found, presumed lost). [Provisional synonym.]

Tetramorium pusillum st. *mossamedense* var. *tristis* Santschi, 1917: 285. Syntype workers, RHODESIA: Bulawayo, 19.x.1913 (*G. Arnold*) (NM, Basle) [examined]. [Name unavailable.]

WORKER. TL 2·1–2·4, HL 0·54–0·60, HW 0·48–0·54, CI 86–92, SL 0·36–0·40, SI 74–80, PW 0·32–0·38, AL 0·60–0·68 (10 measured).

Mandibles longitudinally striate, conspicuously so in most specimens but only delicately marked in some. Anterior clypeal margin entire, without a median notch. The raised lateral portions of the clypeus generally strongly developed, narrowly lamellate and projecting. Frontal carinae variously developed; in many fine and narrow but running back unbroken almost to the occipital margin, distinctly finer and weaker behind the eyes than in front. In some the frontal carinae fade out at the occipital surface and in others they are broken or interrupted along their length, either resuming after a gap or having their place taken by one of the longitudinal rugulae. Antennal scrobes moderate to feeble, the majority of specimens with only an extremely weak impression in the sides of the head, but a few with the scrobes more strongly developed and roughly intermediate between the usual conditions seen in *simillimum*-complex and *poweri*-complex. Eyes moderate, maximum diameter 0·11–0·13, about 0·23–0·24 × HW and with 7–8 ommatidia in the longest row. Propodeum armed with a pair of short triangular teeth which at most are only as long as the metapleural lobes and are usually shorter. Petiole in dorsal view broader than long. Dorsum of head with fine, spaced out longitudinal rugulae, the spaces between them glossy and with only superficial weak ground-sculpture. Dorsal alitrunk with fine punctulate or shagreened ground-sculpture which is more strongly developed than that on the head, overlaid by some fine, longitudinal rugulae at least on the anterior pronotum. Petiole and postpetiole finely punctulate or shagreened, sometimes with one or two regular vestiges visible. First gastral tergite unsculptured. Dorsal surfaces of head and body with short, stout, blunt hairs. Colour varying from light brown to dark brown, the darker specimens usually those with the scrobes more strongly developed.

As with a couple of other species in this group I suspect that more than one species may be present here but I am unable to progress further due to lack of material, both of this species and of its relatives.

In the present situation *mossamedense* separates from other members of the *poweri*-complex as follows. *T. ghindanum* and *nefassitense* have the first gastral tergite extensively and quite coarsely sculptured, unsculptured in *mossamedense*. *T. pauper* and *poweri* have the frontal carinae vestigial or absent whereas they are present and conspicuous although only fine and narrow in *mossamedense*. *T. altivagans* is a larger, more darkly coloured species than *mossamedense*, and has longer antennal scapes (compare *altivagans* HW 0·52–0·56, SL 0·44–0·50, SI 84–91 with the measurements given above). *T. pusillum* and *nigrum* are both small, dark species, the former with unsculptured mandibles and the latter without developed propodeal teeth. This leaves *caldarium*, the closest relative of *mossamedense*, especially those forms mentioned under *caldarium* in which the frontal carinae are relatively close together. The two are best separated by comparing the sculpture of the dorsal head. In *caldarium* the longitudinal rugulae of the cephalic dorsum are weakly developed, fine and narrow and are superimposed upon a finely reticulate-punctate or granular ground-sculpture which serves to make the rugulae even less conspicuous. In *mossamedense* on the other hand the cephalic rugulae are conspicuous and sharply defined, the effect being enhanced by the lack of strong ground-sculpture. Besides this the scapes of *caldarium* tend to be somewhat longer (SI 79–87) than *mossamedense*, although there is some overlap of the ranges.

MATERIAL EXAMINED

Rhodesia: Bulawayo (*G. Arnold*); Cawston Farm, Umgusa (*G. Arnold*); Fletcher's Creek (*G. Arnold*). **South Africa**: Cape (*H. Brauns*).

Tetramorium nefassitense Forel **stat. n.**

Tetramorium caespitum var. *nefassitensis* Forel, 1910*c*: 260. Syntype workers, ETHIOPIA: Nefassit (*K. Escherich*) (MHN, Geneva) [examined].

WORKER. TL 2·0–2·1, HL 0·56–0·58, HW 0·50–0·51, CI 88–89, SL 0·37–0·38, SI 74, PW 0·32–0·34, AL 0·56–0·58 (2 measured).

Mandibles longitudinally striate; anterior clypeal margin entire, the median clypeal carina strongly developed and distinctive. Eyes well developed, maximum diameter *c.* 0·13, about 0·25–0·26 × HW, with 9 ommatidia in longest row. Frontal carinae very feeble, discernible to level of eye but no more strongly developed than other longitudinal cephalic sculpture. Behind level of eyes frontal carinae absent as such, absolutely indistinguishable from other cephalic sculpture. Antennal scrobes absent. Sides of head behind eyes more or less parallel, slightly convergent towards the occipital corners, the latter rounded. In full-face view the sides behind the eyes without projecting hairs between the eyes and the stout hair at the occipital corner. Alitrunk in profile with only the feeblest trace of indentation at the metanotum, the propodeal dorsum sloping towards a pair of minute triangular denticles. Metapleural lobes broadly triangular and much more massively developed than the propodeal denticles. Petiole in profile with the tergal portion of the node higher than long, the anterior and posterior faces almost parallel, very slightly convergent dorsally. Petiole node in dorsal view much broader than long. Dorsum of head finely but quite strongly evenly longitudinally rugulose, the spaces between them with a weak ground-sculpture so that the surface is shining. Dorsal alitrunk finely reticulate-punctulate with a few very faint longitudinal rugulae on the pronotum. Dorsal surfaces of petiole and postpetiole densely reticulate-punctulate, granular in appearance. Basal one-third of first gastral tergite as strongly punctulate as postpetiole. Standing hairs present on all dorsal surfaces of head and body, short, stout and blunt, such hairs absent from the appendages. Colour mid to dark brown, the appendages pale brown.

This small species is apparently closest related to *ghindanum*, which has similar strong gastral sculpture. The two are, however, easily separated as in *ghindanum* projecting hairs are present on the sides of the head behind the eyes and the eyes themselves are smaller.

Tetramorium nigrum Forel **stat. n.**

Tetramorium pauper subsp. *nigrum* Forel, 1907*b*: 15. Holotype worker, KENYA: Mto-ya-Kifaru (*Katona*) (type not found).

Tetramorium brevis Weber, 1943: 370. Holotype worker, SUDAN: Imatong Mts, W. slopes, 2.viii.1939, 5600 ft [1710 m], no. 1405 (*N. A. Weber*) (MCZ, Cambridge) [examined]. **Syn. n.** [Junior primary homonym of *Tetramorium breve* Santschi, 1924: 213.]

WORKER. TL 1·9, HL 0·52, HW 0·44, CI 85, SL 0·34, SI 77, PW 0·30, AL 0·55.

Mandibles mostly smooth but with delicate traces of striation. Anterior clypeal margin without a median notch, regularly arcuate. Frontal carinae feeble but extending back beyond the eyes, posteriorly no more strongly developed than the remaining cephalic sculpture. Antennal scrobes vestigial. Eyes of moderate size, maximum diameter 0·11, about 0·25 × HW and with 7 ommatidia in the longest row. Propodeum in profile sharply descending posteriorly, the dorsum and declivity separated only by an angle or a pair of minute tubercles, without triangular teeth. Petiole node in dorsal view broader than long. Dorsum of head irregularly and finely longitudinally rugulose, the ground-sculpture a fine superficial punctulation or shagreening. Dorsal alitrunk with a similar ground-sculpture to that of head, overlaid by numerous fine, short longitudinal rugulae. Petiole and post-petiole finely punctulate and with vestigial traces of rugular sculpture. First gastral tergite smooth and shining. All dorsal surfaces of head and body with scattered short, stout, blunt hairs. Colour dark brown, the appendages yellow-brown.

This minute species resembles a small version of *altivagans* but is separated from it by lacking developed propodeal teeth and by having shorter antennal scapes (SI 84–91 in *altivagans*). Despite this I am not really sure that the differentiation is justified as a short series from Botswana, Okavango, collected by A. Russell-Smith matches *nigrum* (as represented by *brevis* holotype) in many respects but is intermediate in size between that species and *altivagans* and originates a great distance away from the localities noted above. The problem of how many species are represented here is unable to be solved at present and will have to await the amassing of more material in this complex from all over eastern and southern Africa. Despite this confusion I feel fairly certain of the synonymy of *nigrum* with *brevis* as Weber's holotype matches Forel's original description of *nigrum* very well.

Tetramorium oculatum Forel

(Figs 87, 88)

Tetramorium oculatum Forel, 1913*b*: 116. Syntype workers, RHODESIA: Redbank, 7.iv.1912 (*G. Arnold*) (BMNH; MHN, Geneva) [examined].

WORKER. TL 2·4–3·2, HL 0·60–0·78, HW 0·58–0·76, CI 94–97, SL 0·38–0·50, SI 63–67, PW 0·40–0·56, AL 0·70–0·94 (25 measured).

Mandibles longitudinally striate. Anterior clypeal margin entire, without trace of a median impression. Frontal carinae reaching back at least to level of posterior margins of eyes, sometimes slightly longer; carinae very feeble, no more strongly developed than the remaining cephalic rugular sculpture. Antennal scrobes vestigial. Eyes enormous, maximum diameter 0·22–0·28, about 0·37–0·39 × HW; in full-face view the eyes situated in the anterior half of the length of the sides, in profile curving down towards the ventral surface anteriorly. At the point where the anterior margin of the eye comes closest to the mandibular insertion the gap between the two is only about 0·25 × the maximum diameter of the eye, or even less. Head appearing roughly square in outline in full-face view, in fact slightly longer than broad (CI above). Metanotal groove impressed in profile. Propodeum armed with a pair of short triangular teeth. Metapleural lobes low and rounded. Petiole in profile with the height of the tergal portion of the node slightly greater than its dorsal length; in dorsal view the node distinctly broader than long. Dorsum of head finely longitudinally rugulose with a fine punctulate or granular ground-sculpture, fainter in small individuals than in large ones. Dorsal alitrunk rugulose with a conspicuous reticulate-punctate ground-sculpture. Dorsal surfaces of petiole, postpetiole and at least base of first gastral tergite densely finely reticulate-punctulate. Dorsal surfaces of head, promesonotum, petiole and postpetiole with short stout blunted hairs, such hairs absent from propodeum. First gastral tergite with appressed long greyish pubescence and with scattered, slightly elevated stout hairs. Ventral surface of head with a few very long curved hairs arising just posterior to the buccal cavity. Colour blackish brown to black.

A very conspicuous species, easily separated from all other members of the complex (and indeed all other members of the *simillimum*-group) by its enormously developed eyes.

MATERIAL EXAMINED

Rhodesia: Bulawayo (*G. Arnold*); Hillside Dams (*G. Arnold*); Khami (*G. Arnold*); Victoria Falls (*G. Arnold*); Umgusa Riv., Sipopoma (*G. Arnold*); Nyamandhlovu (*G. Arnold*). **Botswana**: Okavango Delta, Maxwee (*A. Russell-Smith*). **South Africa**: Natal, Durban (*H. B. Marley*); Natal, Dukuduku For. Res. (*W. L. & D. E. Brown*).

Tetramorium pauper Forel

Tetramorium pauper Forel, 1907*b*: 14. Holotype worker, KENYA: Mto-ya-Kifaru (*Katona*) (MHN, Geneva) [examined].

WORKER. TL 2·0–2·2, HL 0·55–0·60, HW 0·48–0·52, CI 86–89, SL 0·37–0·41, SI 76–83, PW 0·32–0·36, AL 0·58–0·64 (6 measured).

Mandibles smooth with scattered pits and usually also with one or two exceedingly fine striae. Anterior clypeal margin without a median notch, the clypeal median carina distinct. Frontal carinae ending just behind the frontal lobes, well before the level of the eyes. Antennal scrobes absent, the head evenly convex across the space between the eyes. Eyes small, maximum diameter 0·06–0·07, about 0·13–0·15 × HW and with only 4 ommatidia in the longest row; the entire eye with only 10–12 facets altogether. With the head in full-face view it is broadest across the eyes, the sides shallowly convex and converging anteriorly and posteriorly so that the head is distinctly broader at eye-level than at the occipital corners. Propodeum armed with a pair of minute denticles which are much smaller than the metapleural lobes. Petiole narrowing slightly from base to apex and in dorsal view slightly broader than long. Dorsum of head mostly smooth and glossy, with an exceptionally feeble superficial ground-sculpture and sometimes with a few almost effaced vestigial rugulae. Dorsal surfaces of alitrunk with vestigial markings of ground-sculpture which are almost completely effaced, the pedicel segments and gaster smooth dorsally. All dorsal surfaces of head and body sparsely covered with short, stout, blunt hairs, most of which are shorter than the maximum diameter of the eye but a few longer hairs are present on the anterior pronotum, the pedicel segments and the gaster. Hind tibiae only having minute decumbent or appressed pubescence. Colour uniform yellowish brown or light brown.

This distinctive minute species is easily separated from its relatives in the *poweri*-complex of this group by its very small eyes and complete lack of frontal carinae and antennal scrobes. The eyes here are the smallest yet known in the *simillimum*-group and this is reflected by the fact that in the key *pauper* runs out with the small-eyed species of the *shilohense*-group. Its affinities with the *simillimum*-group are, however, apparent in the reduced propodeal spines and short blunt pilosity.

Tetramorium poweri Forel **stat. n.**

Tetramorium simillimum var. *poweri* Forel, 1914: 225. Syntype workers, SOUTH AFRICA: Kimberley, 1912 (*Power*) (BMNH; NM, Bulawayo) [examined].

WORKER. TL 2·6–2·8, HL 0·66–0·70, HW 0·56–0·58, CI 83–85, SL 0·50–0·52, SI 86–89, PW 0·40–0·42, AL 0·76–0·80 (6 measured).

Mandibles smooth with scattered pits or at most with faint vestiges of sculpture. Anterior clypeal margin entire, without trace of a median notch and with the median carina sharply defined. Frontal carinae vestigial or absent, sometimes ending in front of the level of the anterior margins of the eyes but more commonly extended back to beyond eye-level by a pair of extremely faint lines which are very poorly defined, these lines never reaching the occipital region. Antennal scrobes absent. Eyes small, maximum diameter 0·12–0·13, about 0·21–0·22 × HW and with 6–8 ommatidia in the longest row. Propodeum armed with a pair of minute denticles which are shorter and much narrower than the metapleural lobes. Node of petiole in profile broader than long. Sculpture very reduced. Dorsum of head usually with a couple of extremely feeble rugulae close to the vestigial frontal carinae on each side, but the occipital region and the mid-dorsal longitudinal strip unsculptured. Dorsal alitrunk unsculptured except for the weak lateral marginations and vestigial superficial shagreening, the latter strongest on the propodeum and almost effaced on the pronotum. Dorsal surfaces of petiole, postpetiole and gaster unsculptured or the pedicel segments with vestigial shagreening as on the pronotum. All dorsal surfaces of head and body with sparse short, stout blunt hairs, the tibiae of the middle and hind legs with minute appressed pubescence only. Colour uniform dull yellowish brown, the gaster usually slightly darker in shade.

A very distinctive species within the *poweri*-complex which is characterized by reduced or vestigial frontal carinae and antennal scrobes, *poweri* is distinguished by its relatively small eyes and predominantly unsculptured cephalic dorsum. The lack of sculpture on the head is paralleled in the related *pauper*, but here the eyes are very small (maximum diameter only 0·13–0·15 × HW) and that species is smaller and has longer antennal scapes (HW 0·48–0·52, SI 76–83).

Tetramorium pusillum Emery

Tetramorium pusillum Emery, 1895*a*: 38. Syntype workers, females, SOUTH AFRICA: Cape Town (*E. Simon*) (MHN, Geneva) [female examined].

Tetramorium caespitum st. *ladismithensis* Forel, 1913*b*: 117. Syntype workers, female, SOUTH AFRICA: Ladismith, xii.1912 (*H. Brauns*) (BMNH; MHN, Geneva) [examined]. **Syn. n.**

Tetramorium pusillum var. *tablensis* Forel, 1914: 223. Syntype workers, female, males, SOUTH AFRICA: Cape, Table Mts, 28.xii.1913 (*G. Arnold*) (BMNH; MHN, Geneva) [examined]. **Syn. n.**

WORKER. TL 2·1–2·3, HL 0·54–0·58, HW 0·44–0·48, CI 80–85, SL 0·36–0·40, SI 80–87, PW 0·32–0·34, AL 0·56–0·64 (10 measured).

Mandibles unsculptured, smooth and shining. Anterior clypeal margin entire, without a median notch or impression. Frontal carinae narrow and weak, usually running back beyond level of eyes but often fading out or becoming indistinguishable from remaining sculpture before reaching occiput; sometimes reaching occiput. In many specimens the frontal carinae are broken or interrupted at one or more points along their length. Antennal scrobes vestigial or absent. Eyes moderate, maximum diameter 0·10–0·12, about 0·23–0·25 × HW and with 7–8 ommatidia in the longest row. Propodeum armed with a pair of minute denticles or very short teeth, always shorter than the metapleural lobes. Petiole in dorsal view broader than long. Dorsum of head finely and quite densely longitudinally rugulose, the rugulae fine and narrow but generally sharply defined; this is enhanced by the lack of strong ground-sculpture, the surfaces having only a superficial shagreening. Dorsal alitrunk finely reticulate-punctulate; sometimes this is the only sculpture present but in most a few weak rugulae are developed on the anterior portion of the pronotum. Petiole and postpetiole only with very faint superficial shagreening or almost smooth. First gastral tergite unsculptured. All dorsal surfaces of head and body with scattered short, stout, blunt hairs. Body dark brown or blackish brown.

A small, darkly coloured species separated from its closest relatives (*altivagans* and *nigrum*) by its unsculptured mandibles. It is possible that these three names represent a single variable species but on presently available evidence it seems best to keep them separate.

***Tetramorium rhetidum* sp. n.**

(Fig. 99)

HOLOTYPE WORKER. TL 2·0, HL 0·50, HW 0·45, CI 90, SL 0·38, SI 84, PW 0·32, AL 0·61.

Mandibles glossy with superficial punctulation or faint shagreening, not longitudinally striate. Anterior clypeal margin arcuate and entire, without trace of a median notch or impression and with the median carina strongly defined. Frontal carinae strongly developed and very conspicuous, running back almost to the occipital margin and surmounted throughout their length by a low raised rim or crest, the carinae obviously more strongly developed than any other cephalic sculpture. Maximum separation of frontal carinae at eye level 0·26, about 0·58 × HW. Antennal scrobes broad and well developed, occupying the entire side of the head between the frontal carina and the eye and extending back almost to the occipital corner on each side. Eye markedly ovate, the anterior portion drawn out into a narrowly rounded point; maximum diameter of eye 0·12, about 0·26 × HW and with 7 ommatidia in the longest row. Propodeum armed with a pair of short triangular teeth which are slightly shorter and distinctly narrower than the metapleural lobes. Petiole node in dorsal view about as long as broad. Dorsum of head with a number of scattered, irregular but quite sharply developed longitudinal rugulae and with a weak reticulum on the occipital surface but this sculpture distinctly secondary to a very dense, blanketing reticulate-punctulation which is coarse and sharply defined. This punctulation also covering the scrobal areas where rugular sculpture is completely absent. Dorsal surfaces and sides of alitrunk and pedicel segments also coarsely and densely reticulate-punctulate, the alitrunk at least also with scattered fine rugulae. First gastral tergite unsculptured. All dorsal surfaces of head and body with numerous short stout blunt hairs which are more or less straight. With the head in full-face view the sides behind the eyes with a number of very short, curved decumbent hairs. Middle and hind tibiae only with minute pubescence which is decumbent or appressed. Colour uniform yellow, bright.

PARATYPE WORKERS. TL 1·9–2·1, HL 0·46–0·52, HW 0·43–0·46, CI 87–92, SL 0·36–0·40, SI 82–87, PW 0·30–0·34, AL 0·56–0·64 (8 measured). Maximum diameter of eye 0·11–0·12, about 0·25–0·27 × HW. Maximum separation of frontal carinae at eye level 0·24–0·26, about 0·55–0·58 × HW.

Holotype worker, **Ghana**: Tafo, 2.ix.1970, litter sample (*B. Bolton*) (BMNH).

Paratypes. 4 workers and 1 female with same data as holotype; 4 workers and 1 female with same locality but 25.xi.1970, log mould sample (*B. Bolton*) (BMNH; MCZ, Cambridge; NM, Basle).

Non-paratypic material examined. **Ivory Coast**: Banco Forest nr Abidjan (*W. L. Brown*); Divo (*L. Brader*). **Ghana**: Tafo (*D. Leston*). **Gabon**: Plateau d'Ipassa (*J. A. Barra*); Makokou (*I. Lieberburg*). **Zaire**: Ituri For., Beni-Irumu (*N. A. Weber*).

One of the four species of the *simillimum*-complex of this group in which the head has strong punctulate or granulate ground-sculpture, *rhetidum* is related to *simillimum, bothae* and *delagoense*. The last-named species is quickly differentiated as the sides of the head immediately behind the eyes have a single stout, freely projecting blunt hair which is absent in the other three species.

T. rhetidum is separable from both *simillimum* and *bothae* on the following characters.

rhetidum	*simillimum* and *bothae*
Hairs on first gastral tergite dense and elongate, the longest equal to or greater than the maximum width of the hind tibia.	Hairs on first gastral tergite sparse and short, the longest distinctly shorter than the maximum width of the hind tibia.
Sides of head behind eyes with a number of minute decumbent curved hairs visible in full-face view.	Sides of head behind eyes without such minute decumbent hairs.
Eye conspicuously ovate, drawn out anteriorly, distinctly much longer than high in profile.	Eye more rounded, slightly longer than high in profile and more narrowly rounded in front than behind but not ovate or drawn out anteriorly.

Apart from these features the sculpture of *rhetidum* is coarser and more sharply defined than in its close relatives and the colour is more obviously brighter yellow than in *simillimum*.

As indicated in the material examined *rhetidum* is apparently widely distributed in the rain forest zones of west and central Africa. This material compares well with the type-series and the measurements fall within the range given above.

Tetramorium simillimum (F. Smith)

(Figs 96, 97)

Myrmica simillima F. Smith, 1851: 118. Syntype workers, GREAT BRITAIN: England, Dorset (types lost, presumed destroyed).

Tetramorium simillimum (F. Smith); Mayr, 1861: 15, 61.

Myrmica parallela F. Smith, 1859: 147. Holotype worker, INDONESIA: Aru Is. (*A. R. Wallace*) (UM, Oxford) [examined]. [Synonymy by Bolton, 1977: 131.]

Tetramorium parallelum (F. Smith); Donisthorpe, 1932: 455.

Tetramorium pygmaeum Emery, 1877: 371. Holotype female, ETHIOPIA: Keren (*Beccari*) (probably in MCSN, Genoa). [Synonymy by Forel, 1916: 421.]

Tetramorium simillimum subsp. *denticulatum* Forel, 1902: 235. Holotype worker, INDIA: Barrakpur (*Rothney*) (MHN, Geneva) [examined]. [Synonymy by Bolton, 1977: 131.]

Tetramorium pusillum var. *bantouana* Santschi, 1910*a*: 382, fig. 10. Syntype workers, female, male CONGO: M'Bamou (*Weiss*) (MRAC, Tervuren) [examined]. **Syn. n.**

Tetramorium simillimum var. *opacior* Forel, 1913*d*: 81. Syntype workers, SRI LANKA: Peradeniya (MNHU, Berlin) [examined]. [Synonymy by Bolton, 1977: 131.]

Tetramorium pusillum var. *exoleta* Santschi, 1914*a*: 366. Syntype workers, NIGERIA: Lagos (*F. Silvestri*) (NM, Basle) [examined]. **Syn. n.**

Tetramorium pusillum st. *bantuala* [sic] var. *breve* Santschi, 1924: 213. Syntype workers, ZAIRE: Luebo, 16.xii.1921 (*H. Schouteden*) (MRAC, Tervuren) [examined]. [Name unavailable.]

Tetramorium simillimum var. *insulare* Santschi, 1928*b*: 69. Syntype workers, FIJI Is.: Lau, Latei Tonga, 6.ix.24 (*Bryan*); Tuvutha, 11.ix.24 (*Bryan*); Avea, 22.ix.24 (*Bryan*) (NM, Basle) [examined]. [Synonymy by Bolton, 1977: 131. Junior primary homonym of *Tetramorium insulare* Menozzi, 1924: 223.]

Wasmannia auropunctata subsp. *brevispinosa* Borgmeier, 1928: 36, figs 4, 5. Syntype workers, BRASIL: Cabo Fria, viii.1926 (*T. Borgmeier*) (Brazil Nat. Mus.) [Synonymy by Borgmeier, 1937: 240.]

WORKER. TL 2·0–2·7, HL 0·50–0·62, HW 0·42–0·56, CI 85–93, SL 0·34–0·44, SI 75–85, PW 0·30–0·42, AL 0·54–0·68 (100 measured).

Mandibles feebly striate or weakly shagreened, never strongly sculptured; rarely with the sculpture faint but never smooth. Anterior clypeal margin arcuate and entire, without a median notch or impression. Frontal carinae long and strongly developed, running back unbroken almost to the occipital margin and surmounted throughout their length by a narrow raised rim or crest; slightly outcurved posteriorly and fading out around the posterior border of the scrobe. Maximum separation of frontal carinae at eye level 0·55–0·60 × HW. Antennal scrobes well developed, forming a shallow but conspicuous concavity in the sides of the head between the frontal carina and the eye on each side, and extending back almost to the occipital corners. Eyes of moderate size, maximum diameter 0·11–0·15, about 0·23–0·27 × HW, with 7–8 ommatidia in the longest row. Anteroventral angle of eye more narrowly rounded than posterior but not drawn into an elongate point, the eye not conspicuously ovate. With the head in full-face view the sides behind the eyes weakly convex and merging posteriorly into the broadly rounded occipital corners. Propodeum armed with a pair of short triangular teeth which at most are as long as the metapleural lobes but never as broad. Petiole node in dorsal view always slightly broader than long, somewhat variable in shape but always broadening posteriorly before narrowing to the postpetiolar junction. Dorsum of head finely and densely irregularly longitudinally rugulose, the ground-sculpture a fine, dense, conspicuous reticulate-punctulation or granulation. Scrobal areas densely reticulate-punctulate. Dorsal alitrunk finely and predominantly longitudinally rugulose, the spaces between the rugulae densely punctulate or granulate. Petiole and postpetiole similarly sculptured but sometimes with the rugular component vestigial or the sculpture reduced, but never completely absent. First gastral tergite unsculptured or at most with faint shagreening at the extreme base. All dorsal surfaces of head and body with sparse, short blunt stout hairs, those on the first gastral tergite generally slightly longer than on the alitrunk but shorter than the maximum width of the hind tibia. Scapes and tibiae only with short, fine appressed pubescence. Colour yellow to light brown, sometimes with the gaster darker than the remainder but often uniformly coloured.

This small, very successful tramp species most probably originated in Africa as all of its closest relatives are restricted to the Ethiopian region. Within the group *simillimum* is closest to *delagoense, bothae* and *rhetidum*, sharing the characters of strongly developed scrobes and frontal carinae and dense ground-sculpture. Its separation from these species is discussed under their respective descriptions.

T. simillimum is not a particularly variable species but West African populations tend to have the head at the lower end of the width-range given above, giving them a relatively high CI. There is also a tendency in these forms to develop a gaster which is distinctly darker in colour than the head and alitrunk. Whether this is significant is not yet understood and at present I am of the opinion that the species as described above represents a single taxon.

MATERIAL EXAMINED (Ethiopian region)

Ivory Coast: Lamto (*J. Lévieux*). **Ghana**: Legon (*D. Leston*); Tafo (*D. Louis*). **Nigeria**: Gambari (*B. Taylor*); Gambari (*B. Bolton*); Ile-Ife (*J. Medler*); Lagos (*B. Malkin*). **Principe I.** (*Gradwell & Snow*). **Tanzania**: Lake Manyara (*B. Cooper*). **Zambia**: Kapiri Mpochi (*E. S. Ross & R. E. Leech*). **Malawi**: Zomba (no name). **Mozambique**: Zambesi Riv. (*G. Arnold*); Vila Machado (*E. S. Ross & R. E. Leech*). **Rhodesia**: Sibi Valley (*G. Arnold*). **South Africa**: Cape, Table Mt (*Womesley*).

For material examined from elsewhere in the Old World see Bolton (1977) and in the New World see Bolton (1979), and included references.

The *caespitum*-group

Antennae with 12 segments. Sting appendage triangular or dentiform. Anterior clypeal margin entire, without a median notch. Frontal carinae short, sometimes virtually absent, not extending back as far as posterior margins of eyes and usually much shorter. Antennal scrobes absent. Antennal scapes relatively short, SI < 100. Metanotal groove almost always impressed in profile, even if only weakly so. Propodeum armed with a pair of short teeth or denticles, sometimes only with minute tubercles or angles; this armament usually shorter than the metapleural lobes, rarely slightly longer. Petiole in profile commonly with the node quite high and with a short dorsal surface. In dorsal view the petiole node usually distinctly broader than long. Dorsal surfaces of alitrunk, pedicel segments and first gastral tergite with elongate fine, apically acute hairs at least in part, never with all hairs short, stout and blunt. Antennal scapes and dorsal (outer) surfaces of hind tibiae only with short pubescence, varying from suberect to appressed in elevation.

Several taxa from the Ethiopian region were originally described as infraspecific forms of *caespitum* but all of these except *nautarum* are correctly referred to the *simillimum*-group and should be excluded from all further consideration of *caespitum* and its allies. Thus the sole previously described member of the *caespitum*-group in this region is: *Tetramorium nautarum* Santschi **stat. n.** (provisional). This was originally described as *Tetramorium caespitum* st. *nautarum* Santschi, 1918*b*: 156. Holotype worker, ANNOBON I. (*Reichensperger*) (NM, Basle) [examined].

The type-locality of Annobon I. strongly suggests that *nautarum* is an introduction, probably originating in southern Europe. It is here provisionally granted the status of a good species until the taxonomy of the Palaearctic *caespitum*-group has been worked out, but I doubt very much that it will retain this status once the group has been revised; it will probably fall as a synonym of one of the European species.

It can be stressed here that the traditional system of separating *caespitum*-group species from those related to *simillimum*, used so often by authors dealing with Palaearctic forms, does not function on a world-wide basis. The character used was the condition of the frontal carinae which were usually stated as absent in *caespitum*-group and present in the *simillimum*-group. Whilst this more or less holds good for the former group (even though there is some variation), it certainly does not apply to the latter as more than half the species related to *simillimum* have the frontal carinae absent or in various stages of reduction. It was overreliance on this single character which led to the description of so many Ethiopian region taxa as infraspecific forms of *caespitum*, merely because their frontal carinae were not as strongly developed as in *simillimum* itself.

The consistent separation of the members of the two groups is best reflected by the pilosity, which applies throughout both species-groups. In the *simillimum*-group the hairs on the dorsal alitrunk (and also elsewhere) are short, stout and blunt or truncated apically, whilst species of the *caespitum*-group have hairs which are elongate, fine and apically acute.

The *convexum*-group

Antennae with 12 segments. Sting appendage triangular or dentiform. Mandibles smooth and shining with scattered pits. Anterior clypeal margin entire, without a median notch or impression. Frontal carinae very short (*convexum*) or absent (*wadje*). Antennal scrobes absent. Antennal scapes short, SI 68–75. Eyes of moderate size, the maximum diameter 0·24–0·27 × HW. Propodeum absolutely unarmed or with a pair of short teeth. Petiole nodiform, with a short thick anterior peduncle; in dorsal view node slightly broader than long. Pilosity consisting of numerous fine standing hairs which are acute apically (*convexum*) or of minute appressed hairs only (*wadje*), never with short, stout, apically blunt hairs. Appendages without standing long hairs, either with short appressed or suberect-subdecumbent pubescence.

The two small species placed in this group are put together for convenience and do not appear to be related. Neither of them is obviously related to any known group of *Tetramorium* and their affinities are unclear. Reasons for isolating them from various groups with which they seem to have affinities are given under the species diagnoses.

Tetramorium convexum sp. n.

HOLOTYPE WORKER. TL 1·9, HL 0·46, HW 0·38, CI 83, SL 0·26, SI 68, PW 0·26, AL 0·52.

Mandibles smooth and shining, highly polished and with a few minute pits. Anterior clypeal margin convex, without trace of a median notch or impression. Median clypeal carina absent, the clypeus unsculptured. Frontal carinae very short and weak, ending in front of the level of the midlengths of the eyes. Antennal scrobes completely absent. Scapes relatively short and stout (SI range 68–70). Eyes at the exact midlength of the sides of the head, maximum diameter of eye 0·10, about 0·26 × HW, with 6–7 ommatidia in the longest row. The eyes are roughly circular in outline, the longitudinal axis only minimally greater than the vertical. Alitrunk in profile with an extremely shallow flattened area between promesonotum and propodeum forming a vestigial impression. Propodeum absolutely unarmed, without the slightest trace of spines or teeth, the dorsum and declivity meeting in an even, shallowly convex curve. Metapleural lobes reduced to a pair of narrow, low blunt flanges. Petiole in profile with a short, thick anterior peduncle the dorsal surface of which forms a shallowly concave arc with the anterior face of the node. Petiole node itself squat and low, with both antero- and posterodorsal angles blunt. In dorsal view the node subglobular, rounded and slightly broader than long. Dorsum of head mostly smooth and shining, with only the faintest vestiges of undefined sculpture between the remnants of the frontal carinae and with 2–3 very feeble short striae immediately behind the posterior clypeal margin. Dorsal alitrunk with a few very weak longitudinal rugulae and the petiole also with some faint fine rugulae visible. Postpetiole with only the most minute vestiges of rugular sculpture. Gaster smooth and shining. All dorsal surfaces of head and body with numerous fine, soft hairs which are acute apically. Antennal scapes and dorsal (outer) surfaces of middle and hind tibiae with short suberect to subdecumbent pubescence. Head dark brown, the remainder of the body and the appendages dull yellow, much lighter in shade than the head.

PARATYPE WORKERS. TL 1·9–2·0, HL 0·46–0·47, HW 0·39–0·40, CI 84–85, SL 0·27–0·28, SI 69–70, PW 0·26, AL 0·52–0·54 (2 measured). Maximum diameter of eye 0·10, about 0·25–0·26 × HW. As holotype but one with a single feeble lateral rugula on the clypeus.

Holotype worker, **Ghana**: Aburi, 11.v.1969 (*P. Room*) (BMNH).
Paratypes. 2 workers with same data as holotype (BMNH; MCZ, Cambridge).

A minute but easily defined leaf-litter inhabiting species, *convexum* does not appear to have any known close relatives. It is grouped for convenience here with *wadje* as the two have a number of characters in common (see species-group diagnosis) but I am sure that these have been acquired convergently and do not represent a true relationship.

T. convexum is isolated from all other species with 12-merous antennae by its combination of very small size, smooth mandibles, entire clypeal margin, very short frontal carinae, reduced sculpture, absolutely unarmed propodeum, fine acute pilosity, and standing pubescence on the appendages.

It is tempting to associate *convexum* with the members of the *simillimum*-group, but the form of the pilosity and the presence of standing pubescence on the scapes and tibiae militate against it. Similarly, many of its characters are in accord with those seen in *caespitum* and its allies, but the form of the petiole is wrong, the pronotal angles are rounded in *convexum* and the head does not have the broad, flattened aspect pf the *caespitum*-group members.

It corresponds in many respects with the smaller, less strongly sculptured species of the *shilohense*-group (*subcoecum*-complex) but of course in these forms the eyes are very small or minute, whilst the eyes of *convexum* are quite large and conspicuous.

As stated above, it is grouped here with *wadje*, for the sake of convenience, another species without obvious relatives. The two are easily separable as *convexum* has erect hairs on the dorsal alitrunk and the propodeum is unarmed, whilst in *wadje* erect hairs are absent and the propodeum has a pair of short triangular teeth.

Tetramorium wadje sp. n.

HOLOTYPE WORKER. TL 2·3, HL 0·55, HW 0·45, CI 82, SL 0·32, SI 71, PW 0·32, AL 0·64.

Mandibles smooth and shining with scattered small pits. Anterior clypeal margin entire, without trace of a median notch. Median clypeal carina weakly defined but present. Frontal carinae absent, the frontal lobes not extending beyond the limits of the impressions within which the antennae are articulated. Antennal scrobes completely absent, the head evenly transversely convex between the eyes. Antennal scapes short (SI range 69–75 in type-series). Eyes moderate, maximum diameter 0·12, about 0·27 × HW and with 6 ommatidia in the longest row. With the alitrunk in profile the promesonotal dorsum more or less flat and on a slightly higher level than the propodeal dorsum so that there is a shallow step-down between the two surfaces. Propodeal dorsum very shallowly convex and ending in a pair of very short, broad teeth which are shorter than the low blunt metapleural lobes. Petiole in profile with a short, thick anterior peduncle which has a conspicuous tooth ventrally. Tergal portion of node slightly higher than the dorsal length, the node narrowing slightly from base to apex and with the posterodorsal angle more bluntly rounded than the anterodorsal. In dorsal view the node very slightly broader than long. Dorsum of head with numerous very fine weak irregular longitudinal rugulae superimposed upon a finely punctulate or granular ground-sculpture. Dorsal surfaces of alitrunk, petiole and postpetiole unsculptured or at most with vestigial superficial shagreening, the surface to a large extent shining. First gastral tergite unsculptured except for minute pits from which the hairs arise. Standing hairs absent from all dorsal surfaces of the head and body, but all dorsal surfaces with appressed pubescence or appressed very short, fine hairs. Appendages only with appressed fine pubescence. Colour uniform dull yellow.

PARATYPE WORKERS. TL 2·2–2·3, HL 0·54–0·56, HW 0·44–0·45, CI 81–83, SL 0·31–0·34, SI 69–75, PW 0·31–0·32, AL 0·62–0·64 (6 measured). Maximum diameter of eye 0·11–0·12, about 0·24–0·27 × HW and with 5–6 ommatidia in the longest row. In some the propodeal spines and metapleural lobes are somewhat more strongly developed than in the holotype and the sculpture of the dorsal alitrunk may be more or less effaced.

Holotype worker, **Ghana**: Aburi, 1.iii.1969 (*P. Room*) (BMNH).

Paratypes. **Ghana**: 2 workers and 1 female with same data as holotype; 3 workers, Tafo, K2, 23.ix.1975 (*C. Campbell*). **Nigeria**: 1 worker, C.R.I.N., Onipe, tree 19/18, 14.i.1975, blackpod project (*B. Taylor*). (BMNH; MCZ, Cambridge.)

This small species has no known close relatives but may perhaps be descended from the *simillimum*-group. Most of the reductions seen in the *poweri*-complex of that group are taken to extremes in *wadje* but, and this is critical, the short blunt hairs characteristic of all members of the *simillimum*-group are absent in *wadje*, being replaced by minute appressed fine hairs all over the body. Because of this *wadje* is excluded from that group and is placed here with *convexum*, purely for convenience. The two species have a number of characters in common as noted in the species-group diagnosis, but they are easily separated as *convexum* has numerous fine hairs on the dorsal surfaces of the head and body and lacks propodeal armament.

The *sericeiventre*-group

(Figs 101–111)

Antennae with 12 segments. Sting appendage triangular to pennant-shaped. Mandibles longitudinally striate (except in *longicorne*), usually coarsely so. Median portion of clypeus evenly convex and entire; generally with a narrow anterior apron but without trace of a median notch or impression. Lateral portions of clypeus characteristically shaped: in full face view (Fig. 103) the raised portions in front of the antennal insertions tilted forward so that the internal face is visible, and the central section of the raised portion projecting forwards as a lobe or tooth which obscures part of the basal border of the mandible on each side. When the head is viewed from above and slightly behind (Fig. 104) the raised lateral portions of the clypeus are seen to rise to a peak in front of the antennal insertions and then slope down very steeply towards the median part of the clypeus. Antennal scapes long, SI 100 or usually greater. Frontal carinae short, feeble, usually ending at or before the level of the posterior margins of the eyes (short but strongly developed in *longicorne*). Antennal scrobes absent. Alitrunk in profile long and low, the propodeum armed with a pair of spines. Metapleural lobes usually elongate-triangular, usually about as long as the propodeal spines and running roughly parallel to them. Petiole node in profile rectangular, longer than high; in dorsal view usually longer than broad but sometimes only about as long as broad. Sculpture varying from species to species but basically of a dense punctulate or granular ground-sculpture overlaid in places by rugulae on the head and alitrunk. Pilosity variable in density in the group and used to divide into a number of complexes of closely related species, as discussed below.

The *sericeiventre*-group contains 13 species, all of which are distributed in grassland, savannah, semi-desert or desert conditions in Africa. Many of the species have a very wide range indeed and *sericeiventre* itself is found throughout the continent from the Mediterranean to the Cape, as well as occurring in the Arabian peninsula and the Malagasy region. It seems capable of existing anywhere that the soil is sandy or well-drained and where there is no continuous cover of tree canopy, so that the ground receives direct insolation. Other species have smaller ranges than this. Some are known only from a single country at present, for instance *xuthum, asetyum* and *petersi* from Ghana, Nigeria and South West Africa respectively; and *bulawayense* and *gladstonei* from Rhodesia. Others, represented only sporadically in collections, indicate a wide range in the Ethiopian region but at a density much lower than that of the ubiquitous *sericeiventre*. Here fall *khyarum*, known from Ivory Coast, Nigeria, Zaire and Botswana, and *longicorne*, the most abberant member of the group, from Nigeria, Kenya, Tanzania and Rhodesia.

Two members of the group, *asetyum* and *xuthum*, are known to prey on ants of the genus *Pheidole*, though whether this habit is more widespread in the group remains unknown. It is amazing that the feeding habits of *sericeiventre*, perhaps the commonest tetramoriine ant in Africa, are not better known (but see Lévieux, 1972).

Within the group the species may be divided into two complexes based on pilosity characters. The first of these, the *bequaerti*-complex, contains the four species *bequaerti, bulawayense, hortorum, xuthum*, which are characterized by the presence of numerous or abundant short, standing hairs on the antennal scapes and on the tibiae of the middle and hind legs. The first three named are very closely related and have the hairs on the body and appendages spaced out and relatively stout. The final species has, on the other hand, a dense pelt of soft fine pilosity which sets it apart from the first three.

The second complex, based on *sericeiventre*, has members in which the scapes and tibiae lack standing hairs of any description, only short decumbent to appressed pubescence being present. There is a gradation of body pilosity within the complex and the nine species present in it can be associated together as follows.

The species *asetyum, khyarum, petersi* and *sepositum* are more densely hairy forms with hairs present on the propodeal dorsum and usually also projecting from the sides of the head behind the eyes (not in *khyarum*). The less densely hairy species include *gladstonei, quadrispinosum* and *sericeiventre*, in which hairs are absent both from the propodeal dorsum and from the sides of the head behind the eyes.

These reductions in pilosity are taken to extremes in *longicorne*, where the dorsal alitrunk is entirely devoid of hairs, but this species is also specialized in other respects as its eyes are larger than is usual in this group; the frontal carinae, though short, are strongly developed, and the mandibles lack the longitudinal striation present in all other species of the group.

Finally there is *microgyna*. This is an inquiline species known only from females found in nests of *sepositum* and *sericeiventre* in Rhodesia and South Africa. Nothing is known of its habits.

***Tetramorium asetyum* sp. n.**

(Fig. 101)

HOLOTYPE WORKER. TL 4·1, HL 0·94, HW 0·80, CI 85, SL 0·89, SI 111, PW 0·58, AL 1·12.

Mandibles coarsely longitudinally striate. Anterior clypeal margin entire, without trace of a median notch. Median clypeal carina sharply developed and conspicuous. Frontal carinae very short and feeble, asymmetrical in the holotype, the right-hand side carina ending in front of the level of the anterior margins of the eyes whilst the left-hand side carina runs almost to the level of the midlengths of the eyes before fading out. The paratype specimens have symmetrical carinae varying between ending in front of the eyes and reaching back almost to the level of their posterior margins, but always very feeble and weak. Antennal scrobes absent. Scapes long, SI > 100 (range 111–118 in type-series). Maximum diameter of eyes 0·20, about 0·25 × HW, the longest row with 12–13 ommatidia. Propodeum in profile armed with a pair of spines which are slightly longer than the metapleural lobes, the latter broad basally but narrowly spiniform at the apex. Petiole node in profile long and low, the dorsal length greater than the height of the tergal portion. In dorsal view the petiole node about as long as broad. Dorsum of head finely but strongly longitudinally rugulose, with a weak reticulum occipitally and with a conspicuous reticulate-punctate ground-sculpture everywhere.

Dorsal alitrunk longitudinally coarsely rugose, the rugae strongest on the pronotum; ground-sculpture reduced, feeble everywhere on the dorsal alitrunk but particularly inconspicuous on the pronotum. Petiole and postpetiole coarsely rugulose, the spaces between rugulae densely punctate. First gastral tergite densely sculptured everywhere and opaque, the sculpture consisting of very fine punctulae or shagreening, the punctures often aligned (especially basally), giving the impression of extremely fine striation or costulation. All dorsal surfaces of head and body densely clothed with erect or suberect hairs, the propodeal dorsum alone with 4–5 pairs, other surfaces correspondingly densely hairy. With the head in full-face view the sides with numerous stout hairs projecting beyond the outline, those in front of the eyes distinctly longer than those behind; behind the eyes with at least 10 projecting hairs on each side. Dorsal (outer) surfaces of hind tibiae with elongate fine pubescence which is decumbent to appressed. Antennal scapes with short appressed pubescence and also with scattered short hairs which are suberect or subdecumbent. Colour uniform dark brown, with a reddish tint.

PARATYPE WORKERS. TL 3·9–4·1, HL 0·90–0·94, HW 0·74–0·80, CI 81–85, SL 0·86–0·90, SI 111–118, PW 0·54–0·58, AL 1·06–1·14 (4 measured). Maximum diameter of eye 0·18–0·20, about 0·24–0·26 × HW. As holotype, with the variqtion noted above. Gastral sculpture is dense and obvious in all members of the type-series, but noting the variation possible in this sculpture in other members of the group it is most probable that more lightly sculptured individuals will be found.

Holotype worker, **Nigeria**: 18 km N. of Mokwa, 29.iv.1977, prey on *Pheidole* (*C. Longhurst*) (BMNH). Paratypes. 4 workers and 2 females (one alate), with same data as holotype (BMNH; MCZ, Cambridge).

Only two known species in the *sericeiventre*-complex of this group have abundant pilosity projecting from the sides of the head behind the eyes, *asetyum* and *petersi*. Differentiation of the two is given under the latter heading.

Tetramorium bequaerti Forel

(Fig. 107)

Tetramorium bequaerti Forel, 1913*a*: 318. Syntype workers, ZAIRE: Katanga, Lake Kabwe, 16.vii.1911 (*Bequaert*) (MRAC, Tervuren; MHN, Geneva) [examined].

Tetramorium humile Santschi, 1913*b*: 434. Syntype worker, female, TANZANIA: Morogoro (NM, Basle) [female examined]. **Syn. n.**

WORKER. TL 4·3–4·6, HL 0·98–1·05, HW 0·84–0·90, CI 85–87, SL 0·90–0·94, SI 104–106, PW 0·66–0·70, AL 1·28–1·32 (5 measured).

Mandibles strongly longitudinally striate. Anterior clypeal margin entire, without trace of a median notch. Median clypeal carina strongly developed. Frontal carinae short and vestigial, at most extending back to level of midlengths of eyes, generally shorter; frontal carinae always very fine, sometimes indistinct except for immediately behind the frontal lobes. Antennal scrobes absent. Scapes long, SI > 100. Eyes moderate, maximum diameter 0·21–0·24, about 0·23–0·26 × HW. With the head in profile the lower occipital corner strongly projecting into a blunt lobe or lug which at its apex is about as broad as the maximum eye diameter. Propodeum armed with a pair of elongate spines, the metapleural lobes broadly triangular, elongate and running roughly parallel to the propodeal spines, which are narrower. Petiole node in profile elongate, rectangular, the dorsal length greater than the height of the tergal portion. In dorsal view the node longer than broad. Dorsum of head feebly sculptured, usually only with a sparse superficial punctulation or granulation, sometimes also with a few weak longitudinal striae. Sides of head in front of and below eyes with fine rugular sculpture, reticulate in places. Dorsal alitrunk with fine, delicate longitudinal striae or rugulae and with a fine, fairly dense but superficial punctulate-granular ground-sculpture. Petiole and postpetiole with same ground-sculpture as is seen on alitrunk but with a stronger rugular component also present which may form meshes on the sides and dorsum. First gastral tergite finely punctulate-shagreened everywhere. All surfaces of head and body and all surfaces of scapes, femora and tibiae with abundant short, blunt, erect to suberect stout hairs. Colour dull red.

Of the four species of the *bequaerti*-complex, characterized by their possession of standing hairs on the scapes and tibiae, *bequaerti* is easily separated from the other three (*bulawayense, hortorum, xuthum*) by its larger size, short blunt pilosity, and especially by the presence in *bequaerti* of a prominent lobe or lug at the lower occipital corner, not seen in related species (compare Figs 106 and 107).

Tetramorium bulawayense Forel **stat. n.**

(Fig. 106)

Tetramorium bequaerti st. *bulawayensis* Forel, 1913*b*: 119. Syntype workers, RHODESIA: Bulawayo, (15).ii.1913 (*G. Arnold*) (BMNH; MHN, Geneva; MCZ, Cambridge) [examined].

Tetramorium bequaerti st. *bruni* Santschi, 1917: 285. Holotype worker, RHODESIA: Hillside, 26.vii.1913 (*G. Arnold*) (NM, Bulawayo) [examined]. **Syn. n.**

Tetramorium bequaerti race *bruni* var. *mashona* Arnold, 1926: 254. Syntype workers, RHODESIA: Umtali, (9).vi.1920 (*G. Arnold*) (NM, Bulawayo; BMNH; MCZ, Cambridge) [examined]. [Name unavailable].

WORKER. TL 3·0–3·5, HL 0·70–0·80, HW 0·60–0·66, CI 83–87, SL 0·62–0·72, SI 103–109, PW 0·46–0·52, AL 0·84–0·95 (25 measured).

Mandibles strongly longitudinally striate. Anterior clypeal margin entire, without a median notch or impression. Median clypeal carina distinct. Frontal carinae short, usually extending back to about the level of the midlengths of the eyes, in some individuals slightly shorter or longer. Although the frontal carinae are fine and narrow they are distinctive due to the feeble sculpture of the head. Antennal scrobes absent. Scapes long, SI > 100. Eyes moderate, maximum diameter 0·16–0·18, about 0·25–0·27 × HW. Occipital margin of head rounding into sides in full-face view; in profile the lower occipital corners rounded, not drawn out into a projecting blunt lobe or lug. Propodeal spines in profile relatively short, narrow and acute. Metapleural lobes elongate-triangular, usually about as long as the propodeal spines and running parallel to them. Petiole node in profile low and rectangular, the dorsal length greater than the height of the tergum of the node. In dorsal view the petiole node as long as or slightly longer than broad. Sculpture of head feeble, in most with a few very shallow or vestigial longitudinal rugulae and with a fine, faint superficial punctulate ground-sculpture. In some samples the ground-sculpture is more pronounced and the rugulae vestigial, whilst in many the entire sculpture is vestigial so that the head is virtually smooth dorsally. Dorsal alitrunk usually with feeble and sparse longitudinal rugulae on the promesonotum, and with faint punctulate or granular ground-sculpture. As on the head one or both of these components may be vestigial. Propodeal dorsum generally more strongly sculptured, commonly with transverse rugulae or more pronounced punctulation, or with both. Rarely this area as weakly sculptured as the promesonotum. Petiole and postpetiole usually finely punctulate, only rarely with this reduced, and also usually with fairly conspicuous rugulose sculpture also present. First gastral tergite finely sculptured, in all samples examined, at least basally. All dorsal surfaces of head and body with numerous standing hairs, quite slender, elongate and generally pointed apically. Antennal scapes, femora and tibiae with numerous spaced-out, short straight hairs projecting from the shafts. Colour varying from reddish yellow to dull red.

The four species known in the *bequaerti*-complex of this group are characterized by their possession of numerous standing hairs on the scapes and tibiae. Of them *xuthum* is a small dark species covered everywhere with a dense pelt of short, soft hairs, and *bequaerti* is a larger species having the lower occipital corner on each side of the head drawn out into a lobe or lug, and also having short, stout, blunt body-pilosity. The two remaining, *bulawayense* and *hortorum*, form a very close species-pair and may in fact represent two extremes of a single species. Notes on their separation are given under *hortorum*.

MATERIAL EXAMINED

Rhodesia: Khami (*G. Arnold*); Bulawayo (*G. Arnold*); Umtali (*G. Arnold*).

Tetramorium gladstonei Forel

Tetramorium gladstonei Forel, 1913*c*: 219. Syntype workers, RHODESIA: Shiloh (*G. Arnold*) (MHN, Geneva) [examined].

WORKER. TL 3·8–4·5, HL 0·94–1·08, HW 0·82–0·90, CI 83–88, SL 0·82–0·96, SI 100–109, PW 0·58–0·66, AL 1·18–1·34 (20 measured).

Mandibles coarsely longitudinally striate. Anterior clypeal margin entire, without trace of a median impression. Median clypeal carina distinct. Frontal carinae short and no more strongly developed than the remaining cephalic rugae, usually ending at about the level of the midlengths of the eyes but fairly frequently extending back to the level of their posterior margins. Antennal scrobes absent. Scapes relatively long, SI usually > 100, only rarely as low as 100. Maximum diameter of eye 0·19–0·22, about 0·22–0·25 × HW. Propodeum armed with a pair of short acute spines which are about as long as or slightly longer than the metapleural lobes; the latter elongate-triangular and running parallel to the propodeal spines. Petiole node low and rectangular in profile, the dorsal length greater than the height of the tergum. In dorsal view the petiole node is usually longer than broad, but in a few it is roughly as broad as long. Dorsum of head strongly and quite densely longitudinally rugose, the ground-sculpture almost entirely effaced so that the spaces between the rugae are quite smooth and very shiny. Promesonotum similarly coarsely longitudinally rugose with virtually smooth interspaces but propodeal dorsum with variable sculpture, the rugae either irregular or strongly transverse (oblique in one worker). Petiole and postpetiole strongly rugose. Basal quarter to one-third of first gastral tergite finely costulate, the spaces punctulate or shagreened; more apical portion of sclerite unsculptured. All dorsal surfaces of head and body except the propodeum with scattered standing hairs. Propodeum without hairs dorsally, the closest pair situated at or just in front of the site of the metanotal groove. Scapes and tibiae with fine decumbent to appressed pubescence only. Colour dark red, with the gaster blackish, glossy.

Along with *quadrispinosum* and *sericeiventre* this species forms a triad of closely related forms within the *sericeiventre*-complex. The three together are characterized by their reduced pilosity, hairs being absent from the scapes, tibiae, sides of head behind eyes and propodeal dorsum. *T. gladstonei* is separated from its allies by its very strong rugose sculpture and suppressed ground-sculpture. In the two related species either the ground-sculpture is a very conspicuous reticulate-punctate mat or the rugosity is vestigial or absent.

MATERIAL EXAMINED

Rhodesia: Shiloh (*G. Arnold*); Umtali (*G. Arnold*); Lonely Mines (*G. Arnold*); Wankie Nat. Pk (*W. L. Brown*).

Tetramorium hortorum Arnold

Tetramorium hortorum Arnold, 1958: 121, figs 2, 2a. Syntype workers, RHODESIA: Victoria Falls, 14.ii.1953 (*G. Arnold*) (NM, Bulawayo) [examined].

WORKER. TL 3·0–3·2, HL 0·72–0·74, HW 0·60–0·64, CI 83–86, SL 0·62–0·66, SI 103–105, PW 0·45–0·50, AL 0·86–0·96 (5 measured).

Answering to the description of *bulawayense* (see above) in all particulars except sculpture, which is denser and coarser in *hortorum*, as follows.

Dorsum of head finely, densely and conspicuously longitudinally rugulose with dense reticulate-punctulate or granular ground-sculpture. Occipital region with a weak ruguloreticulum or at least with numerous anastomoses or cross-meshes. Sides of head in front and behind eye with reticular rugulae, the sides above the eye densely punctulate and sometimes with sparse rugulae. Dorsal alitrunk finely rugulose, longitudinal on the promesonotum but predominantly transverse on the propodeum. Some traces of reticulation may be present on pronotum. Entire alitrunk with dense reticulate-punctate ground-sculpture between the rugulae. Petiole and postpetiole finely rugulose, usually irregular or even reticulate in places, the interspaces punctulate. First gastral tergite finely and densely sculptured, at least basally. Otherwise as *bulawayense*.

In the last analysis *hortorum* is really no more than a densely sculptured version of *bulawayense* and the two may eventually be shown to be variants of a single species. For the present, however, I have elected to keep them separate as no intermediates are known, despite the fact that sculptural density and intensity are notoriously variable in this species-group.

Tetramorium khyarum sp. n.

(Fig. 111)

HOLOTYPE WORKER. TL 4·0, HL 0·96, HW 0·77, CI 80, SL 0·87, SI 113, PW 0·58, AL 1·18.

Mandibles coarsely longitudinally striate. Anterior clypeal margin entire, without trace of a median impression but the median carina sharp and distinct. Frontal carinae short, extending back approximately to level of midlengths of eyes. Antennal scrobes absent. Scapes long, SI > 100. Maximum diameter of eye 0·20, about 0·26 × HW. Propodeum armed with a pair of spines which are paralleled below by the elongate metapleural lobes, which are narrowly triangular. Petiole with an elongate node in profile, the dorsal length of which is greater than the height of the tergal portion. In dorsal view the node is longer than broad. Dorsum of head finely longitudinally rugulose, the spaces between rugulae with superficial punctulate ground-sculpture. Occipital region with a feeble reticulum towards the corners but centrally this disappears and is replaced by a few feeble longitudinal rugulae with 1–2 faint anastomoses. Dorsal alitrunk longitudinally rugose with conspicuous fine punctulate ground-sculpture, the rugae strongest on the pronotum. Petiole and postpetiole finely and irregularly rugose, with fine punctulate ground-sculpture. First gastral tergite blanketed by dense minute punctulation or shagreening and with dense, extremely fine striolae so that the surface is completely opaque and has a silky appearance. All dorsal surfaces of head and body with stout standing hairs, the propodeal dorsum with only a single pair, situated above the spiracles or slightly forward from this position. Scapes and tibiae only with short decumbent or appressed pubescence. Sides of head behind eyes without projecting hairs. Colour dull red, the gaster blackish brown.

PARATYPE WORKERS. TL 4·0–4·3, HL 0·96–1·00, HW 0·76–0·80, CI 79–81, SL 0·87–0·90, SI 113–118, PW 0·56–0·62, AL 1·16–1·22 (4 measured). As holotype but some with the occipital sculpture more pronounced. Maximum diameter of eye 0·18–0·20, about 0·24–0·26 × HW.

Holotype worker, **Nigeria**: Zaria, 11.iii.1969 (*D. Simpson*) (BMNH).

Paratypes. 4 workers with same data as holotype (BMNH; MCZ, Cambridge).

Non-paratypic material examined. **Ivory Coast**: Plantation Niecky (*W. L. Brown*). **Zaire**: Matadi (*E. S. Ross & R. E. Leech*); Zambi (*H. O. Lang*). **Botswana**: Nkate (*Vernay-Lang*); Xani Pan (*A. Russell-Smith*).

In the *sericeiventre*-complex of this group *khyarum* is characterized by its lack of projecting hairs behind the eyes and its possession of a single pair of hairs on the propodeal dorsum. It is most closely allied to *sepositum* but here the sides of the head have projecting hairs and the propodeum has numerous pairs of standing hairs. As in most other species of this complex there is considerable variation in sculpture between different populations, and in the non-paratypic material the main features are as follows.

Sculpture of the first gastral tergite may be reduced to a basal band covering the basal quarter of the sclerite, the remainder being smooth and shining. The punctulate ground-sculpture of the head and alitrunk may be enhanced in some populations and reduced in others, and the same applies to the rugular intensity on the alitrunk and pedicel segments. Measurements of non-paratypic material give the range TL 3·9–4·4, HL 0·88–1·00, HW 0·72–0·80, CI 79–84, SL 0·82–0·90, SI 111–118, PW and AL within paratype range (20 measured). As can be seen from the material examined *khyarum* is widely distributed in savannah and grassland in the western half of the continent but does not seem to be very common. It is not yet known from the eastern half of Africa.

Tetramorium longicorne Forel

(Figs 105, 110)

Tetramorium longicorne Forel, 1907*b*: 13. Holotype worker, KENYA: Mto-ya-kifaru (*Katona*) (MHN, Geneva) [examined].

WORKER. TL 4·4–5·1, HL 0·98–1·14, HW 0·86–1·00, CI 85–89, SL 0·96–1·10, SI 110–120, PW 0·62–0·78, AL 1·28–1·42 (20 measured).

Mandibles usually densely punctulate-shagreened, sometimes also with some delicate longitudinal striation. Median portion of clypeus broad, sloping, transversely and longitudinally more or less flat in its anterior half. Anterior clypeal margin convex and entire, with an anterior apron which projects over the basal mandibular denticle. Median clypeal carina not developed, the broad expanse of the clypeus traversed by a few weak rugulae, all of which are about equally strongly developed. Frontal carinae running back to the level of the posterior margins of the eyes or just beyond it, strongly developed and distinctly raised above the surrounding areas so that the space between them forms a raised platform, especially anteriorly. Antennal scrobes absent. Scapes long, SI > 100 (SL usually approximately equal to HL). Eyes large, maximum diameter 0·27–0·32, about 0·30–0·33 × HW. Anterior pronotum with a strong but blunt transverse crest separating the dorsum from the anterior declivity. Propodeum armed with a pair of long, strong spines which are much longer than the low, bluntly triangular metapleural lobes. Petiole in profile with an elongate, fairly stout peduncle and a node which is roughly square, although the antero- and posterodorsal angles tend to be blunt. Postpetiole in profile with the sternite produced into a blunt ventral process. Petiole node in dorsal view usually broader than long, rarely about as broad as long. Dorsum of head longitudinally rugose between the frontal carinae, but occiput and sides of head between eye and frontal carinae reticulate-rugose. Ground-sculpture between the rugae everywhere of fine punctulation or dense shagreening so that the surfaces have a rough appearance. Dorsal alitrunk rugose, usually strongly so, the rugae predominantly longitudinal and strongest on the pronotum, but often irregular, meandering or with some cross-meshes. Ground-sculpture as on head. Dorsal surfaces of petiole and postpetiole finely, densely and generally irregularly rugulose, although on the postpetiole the rugulae may be mostly longitudinal. Spaces between rugulae packed with punctulate or granular ground-sculpture. Gastral sculpture variable in extent and intensity but at least the basal third of the first tergite (usually more) with dense longitudinal striae or costulate, the spaces between which are filled with fine punctulation. This sculpture always strongest basally, becoming fainter posteriorly on the sclerite. Pilosity very reduced, consisting only of a few scattered very short hairs on the dorsal head and first gastral tergite and sometimes a few similar hairs on the pedicel segments. Sparse longer hairs are present on the remaining gastral segments behind the first but hairs are completely absent from the dorsal alitrunk and the sides of the head. Scapes and tibiae have short appressed pubescence. Colour dull red, the gaster darker.

A very conspicuous species in this group, *longicorne* is easily identified by its lack of hair on the alitrunk, large eyes, broad clypeus, strong frontal carinae and mandibles which are not strongly longitudinally striate. It is not obviously closely related to any other member of the group and must be regarded as a distinct offshoot, occupying a complex of its own, as discussed under the species-group heading.

T. longicorne is widely distributed in the savannah and open grassland zones of the Ethiopian region but appears to be relatively uncommon.

MATERIAL EXAMINED

Nigeria: Damaturu (*E. S. Ross & K. Lorenzen*). **Kenya**: Wamba (*M. E. Irwin & E. S. Ross*); Namanga (*E. S. Ross & R. E. Leech*). **Tanzania**: Ukiriguru (*A. D. Robertson*); Morogoro (*E. S. Ross & R. E. Leech*). **Rhodesia**: Bulawayo (*G. Arnold*); Lonely Mines (*G. Arnold*); Wankie Nat. Pk (*W. L. Brown*); Umtali, Cecil Kop (*W. L. Brown*); Nantwich (*G. Arnold*); Balla-Balla (*G. Arnold*).

Tetramorium microgyna Santschi

Tetramorium microgyna Santschi, 1918*a*: 132. Holotype female, SOUTH AFRICA: Natal, 1895 (*Haviland*) (NM, Basle) [examined].

FEMALE. TL 3·0–3·5, HL 0·72–0·76, HW 0·62–0·66, CI 84–89, SL 0·68–0·70, SI 106–109, PW 0·48–0·56, AL 1·00–1·12 (6 measured).

An inquiline species known only from females (queens) found in nests of *sericeiventre* and *sepositum* in Rhodesia and South Africa and differing radically from the true queens of these species. Females of *microgyna* are much smaller than the host workers, whereas the real females of the hosts are larger than their workers. In terms of colour and sculpture the queens of *sericeiventre* and *sepositum* resemble their workers, but inquiline females of *microgyna* are much lighter, usually dull yellow with brown gaster and are much more delicately and finely sculptured. All surfaces of the head, alitrunk and pedicel segments in *microgyna* are exceedingly finely and incredibly densely shagreened so that the surfaces look dull and very finely granular. Rugulose sculpture is generally absent but in a few individuals some exceptionally fine rugular traces are present on the dorsum of the head between the frontal carinae and more rarely laterally on the mesoscutum. Gaster in most cases is as finely sculptured as the rest of the body but in some there are extremely fine costulae discernible.

MATERIAL EXAMINED

Rhodesia: Woodvale (*G. Arnold*). **South Africa**: Cape, Algoa Bay (*H. Brauns*); Natal (*Haviland*); Houw Hock Pass (*E. S. Ross & R. E. Leech*).

Tetramorium petersi Forel **stat. n.**

Tetramorium blochmanni subsp. *petersi* Forel, 1910*a*: 19. Syntype workers, SOUTH WEST AFRICA: Okahandja (*Peters*) (MHN, Geneva) [examined].

WORKER. TL 3·6–3·7, HL 0·84–0·86, HW 0·68–0·72, CI 81–84, SL 0·78–0·82, SI 114–115, PW 0·50–0·54, AL 1·00–1·06 (3 measured).

Mandibles longitudinally striate. Anterior clypeal margin entire, without trace of a median notch or impression. Median clypeal carina strongly defined, remainder of clypeus unsculptured or at most with a pair of very feeble rugulae. Frontal carinae short and very feebly defined behind the frontal lobes, ending at the level of the eyes and scarcely stronger than the weak cephalic rugulae. Antennal scrobes absent.

Maximum diameter of eye 0·19–0·20, about 0·27–0·28 × HW and with 12–13 ommatidia in the longest row. Alitrunk in profile long and low, weakly and shallowly depressed at the level of the metanotal groove. Propodeum armed with a pair of acute spines. Metapleural lobes long and narrowly triangular, parallel to and as long as the propodeal spines but somewhat stouter than the latter. Petiole in profile long and low, the dorsal length greater than the height of the tergal portion. In dorsal view the petiole node slightly longer than broad. Dorsum of head with scattered fine irregular longitudinal rugulae, the spaces between them with faint superficial ground-sculpture which is inconspicuous. Dorsal alitrunk with pronotum unsculptured, or at most with a few vestigial longitudinal rugulae. Mesonotum similar but the propodeum with fine transverse rugulae. Sides of petiole and postpetiole with sparse fine rugular sculpture which may also be present on the dorsum of the latter, but the dorsum of the petiole with an unsculptured median strip or area. Extreme base of first gastral tergite with exceptionally faint shagreening, the pits from which hairs arise conspicuous. Pilosity dense and distinctive, all dorsal surfaces of head and body with numerous long fine hairs which are acute apically, the longest of those on the pronotum about equal to the maximum diameter of the eye. With the head in full-face view the sides behind the eyes with numerous (usually > 10 on each side) short hairs breaking the outline of the sides. Hairs as densely present on propodeum as elsewhere on dorsal alitrunk. Hairs on first gastral tergite elongate, fine and acute apically. Dorsal (outer) surfaces of hind tibiae with long fine pubescence which is decumbent to appressed. Colour light brown with a slight reddish tint, the gaster darker in shade than the alitrunk.

In the *sericeiventre*-complex of this group, characterized by their lack of short standing hairs on the scapes and tibiae, three species may be isolated by their possession of relatively dense pilosity on the head and body. These are *sepositum, petersi* and *asetyum*, all of which have hairs projecting from the sides of the head behind the eyes and have more than one pair of hairs on the propodeal dorsum. Also in these species the hairs on the alitrunk and gaster tend to be long, slender and fine, broadest basally and tapering along their length to an acute apex. Of these three species *sepositum* has only 1–2 long fine hairs breaking the outline of the head on each side whereas the other two species have numerous short projecting hairs in this region, usually more than 10 on each side and sometimes too numerous to count easily. These two remaining species, *asetyum* and *petersi*, are separated as follows.

asetyum	*petersi*
Dorsum of head with fine dense longitudinal rugulae; ground-sculpture reticulate-punctulate and distinct.	Dorsum of head with scattered feeble longitudinal rugulae; ground sculpture faint and inconspicuous.
Eyes relatively slightly smaller, maximum diameter 0·24–0·26 × HW.	Eyes relatively slightly larger, maximum diameter 0·27–0·28 × HW.
Dorsal alitrunk coarsely longitudinally rugose.	Dorsal alitrunk smooth or with vestigial sparse rugular traces.
Petiole dorsum coarsely rugulose with punctulate spaces.	Petiole dorsum mostly or entirely smooth, not punctulate.
First gastral tergite coarsely sculptured everywhere.	First gastral tergite smooth except for very feeble shagreening at extreme base.

Tetramorium quadrispinosum **Emery**

Tetramorium quadrispinosum Emery, 1886: 362, pl. 17, fig. 8. Syntype workers, South Africa: Cape of Good Hope (*L. Peringuey*) (MRAC, Tervuren; MHN, Geneva) [examined].

Tetramorium blochmannii var. *montanum* Forel, 1891: 152, pl. 5, fig. 2a. Syntype workers, Madagascar: nr Tamatave, Bois de l'Ivondrona (*C. Keller*) (MHN, Geneva) [examined]. [Synonymy by Bolton, 1979: 155.]

Tetramorium blochmanni st. *continentis* var. *eudoxia* Forel, 1914: 231. Syntype worker, South Africa: Cape Prov., Willowmore, i.1914 (*G. Arnold*) (MHN, Geneva) [examined]. [Name unavailable.]

Tetramorium 4-spinosum [sic] st. *elegans* Santschi, 1918*a*: 125. Syntype workers, South Africa: Cape Prov., Willowmore (*H. Brauns*) (BMNH; NM, Basle) [examined]. **Syn. n.**

Tetramorium blochmanni var. *calvum* Stitz, 1923: 162. Syntype workers, South West Africa: Kuibis, 15.vii.1911 (*W. Michaelsen*) (types not in MNHU, Berlin; presumed lost). **Syn. n.**

Tetramorium sericeiventre var. *repertum* Santschi, 1926: 242. Syntype workers, Mozambique: Busi Riv., Inhangovu (*G. Arnold*) (NM, Bulawayo; NM, Basle) [examined]. **Syn. n.**

Tetramorium quadrispinosum race *beirae* Arnold, 1926: 252. Syntype workers, MOZAMBIQUE: Beira, 2.vi.1920 (*G. Arnold*) (BMNH) [examined]. **Syn. n.**

Tetramorium quadrispinosum race *otaviensis* Arnold, 1926: 253. Syntype workers, SOUTH WEST AFRICA: Otavi (*Lightfoot*) (types not found; presumed lost). **Syn. n.**

Tetramorium quadrispinosum st. *angolense* Santschi, 1930: 71. Syntype workers, ANGOLA: Cakindo (*Monard*) (NM, Basle) [examined]. **Syn. n.**

Tetramorium quadrispinosum st. *elegans* var. *benguelense* Santschi, 1937*a*: 232. Syntype workers, ANGOLA: Kapelongo, no. 121 (*A. Monard*) (NM, Basle) [examined]. [Name unavailable.]

WORKER. Fitting the description of *sericeiventre* as regards size, pilosity and details of morphology. Differing only in its sculpture, which is very much reduced when compared with *sericeiventre*. The sculpture of *quadrispinosum* may be summarized as follows.

Head at most with a very feeble superficially punctulate surface sculpture, without the dense reticulate-punctulation which gives the head a granular appearance in *sericeiventre*. Sometimes head of *quadrispinosum* only with superficial markings, the head to a large extent virtually smooth. Rugular sculpture fairly frequent on head but feeble when present. Dorsal alitrunk at most superficially punctulate, very often the punctulae vestigial or effaced so that large areas or all of the surface is glossy and virtually smooth. Rugular sculpture usually absent from alitrunk but a few very low, faint rugulae sometimes occur on the anterior pronotum. Petiole and postpetiole faintly punctulate to almost smooth, rugular vestiges very rare indeed. First gastral tergite unsculptured or at most with only the most delicate of superficial reticulate patterns; glossy, without the dense blanketing sculpture which partially or totally covers the gaster in *sericeiventre*.

Apart from the reduced sculpture there is really nothing to separate *quadrispinosum* and *sericeiventre*, and a case could be made for synonymizing the two quite easily. However, I prefer to keep them separate for the present as the sculptural differences do seem fairly consistent and because the ranges of the two show only partial overlap. As pointed out under *sericeiventre*, the range of that species encompasses the entire Ethiopian region outside of the densely forested zones, and it is quite common. *T. quadrispinosum* on the other hand is known only from the southern part of the continent, the territories of Angola, Botswana, Mozambique, South West Africa and South Africa to be precise. Now, although *sericeiventre* is known from all of these countries, *quadrispinosum* is not apparently found outside them. If *quadrispinosum* were merely a reduced-sculpture variant of *sericeiventre* it should be found almost or quite as widely distributed as that form. Further, both species are present in the Malagasy region and are separable on the same differences as the Ethiopian region populations.

MATERIAL EXAMINED

Angola: Vila Salazar (*B. Malkin*). **Botswana**: Okavango, Shorobe (*A. Russell-Smith*). **Mozambique**: Beira (*G. Arnold*). **South Africa**: Peddie, Gwanga Drift (*B. Marais*); Cape Prov., Montague (*v. d. Merve*); Table Mts (*G. Arnold*); Willowmore (*G. Arnold*); Mossel Bay (*R. E. Turner*); Grahamstown (*W. L. Brown*); Grahamstown (*L. Weatherill & W. L. Brown*); Cape Peninsula (*G. Arnold*); Algoa Bay (*H. Brauns*); Willowmore (*H. Brauns*); Sundays Riv. Valley (*G. Arnold*).

Tetramorium sepositum Santschi **stat. n.**

(Figs 102, 109)

Tetramorium gladstonei var. *seposita* Santschi, 1918*a*: 131. Syntype workers, RHODESIA: Victoria Falls (*G. Arnold*) (NM, Basle) [examined].

WORKER. TL 3·8–4·4, HL 0·84–0·98, HW 0·68–0·80, CI 80–85, SL 0·74–0·86, SI 105–117, PW 0·52–0·64, AL 1·04–1·30 (20 measured).

Mandibles strongly longitudinally striate. Anterior clypeal margin entire; median clypeal carina sharply defined. Frontal carinae short and only weakly developed, usually ending at about the level of the posterior margins of the eyes but sometimes fading out before reaching that level. Rarely the frontal carinae extend behind the level of the eyes and merge into the reticulate-rugose sculpture of the posterior head. Antennal scrobes absent. Scapes long SI always > 100. Eyes of moderate size, maximum diameter 0·18–0·20, about 0·24–0·26 × HW. Propodeum in profile armed with a pair of elongate acute spines which are paralleled below by the strongly developed metapleural lobes which are elongate-triangular, almost as long as the propodeal spines and running roughly parallel with them. Petiole in profile with the node elongate-nodiform; in dorsal view usually longer than broad but sometimes only slightly so. Dorsum of head longitudinally rugulose, the occipital region with a fine rugoreticulum. Ground-sculpture reduced on dorsum of head to a faint superficial punctulation or shagreening, so that the surfaces between rugulae are quite glossy. Pronotal dorsum with strong longitudinal rugae which in some are continued onto the mesonotum, but in most cases mesonotal rugae are much feebler than pronotal. Propodeal dorsum irregularly rugose but in some samples a transverse component predominates. Ground-sculpture of dorsal alitrunk feeble, sometimes almost entirely effaced but generally faintly present. Petiole and postpetiole rugose. Basal quarter to one-third of first gastral tergite sculptured with fine striolae and very fine punctulation or shagreening, very faint in some specimens. Forms with the gaster extensively sculptured remain unknown but probably occur as variation in gastral sculpture is extreme in this group. All dorsal surfaces of head and body with numerous elongate standing hairs which are fine and acute apically. Sides of head behind eyes with one to three freely projecting long fine hairs on each side. Scapes and tibiae only with short decumbent to appressed pubescence. Colour dull red or reddish brown, the gaster darker, commonly blackish brown but often with a reddish tint.

Within the *sericeiventre*-complex of this group four species are relatively densely hairy. These are *asetyum, khyarum, petersi* and *sepositum*. All of them have hairs present on the propodeal dorsum and most of them have hairs projecting from the sides of the head behind the eyes (not *khyarum*). In *petersi* and *asetyum* the projecting pilosity is very dense, with 10 or more hairs on each side behind the eyes, whilst in the remaining pair the number is 0–3 on each side. The separation of *khyarum* from *sepositum* is based on the possession in the former of only a single pair of hairs on the propodeal dorsum, situated above the spiracle or slightly anterior to this, whilst in *sepositum* several pairs of hairs are present. Secondly, the body pilosity in *sepositum* is elongate, fine and acute apically whilst in *khyarum* the hairs are usually stouter, slightly shorter and blunted apically.

This species is one of the two known hosts of the inquiline *T. microgyna*, the other host being *sericeiventre*.

MATERIAL EXAMINED

Rhodesia: Lonely Mines (*H. Swale*); Belingwe (*G. Arnold*); Victoria Falls (*G. Arnold*); Bulawayo, Forestvale (*G. Arnold*); Woodvale (*G. Arnold*); Nantwich (*G. Arnold*).

Tetramorium sericeiventre Emery

(Figs 103, 104, 108)

Tetramorium sericeiventre Emery, 1877: 370. Syntype worker, ETHIOPIA: Sciotel (*Beccari*) (MHN, Geneva) [examined].

Tetramorium blochmannii Forel, 1887: 384. Syntype workers, MADAGASCAR: nr Tamatave, Bois de l'Ivondro (*C. Keller*) (MHN, Geneva) [examined]. [Synonymy by Bolton, 1979: 155.]

Tetramorium sericeiventre var. *debile* Forel, 1894: 80. Syntype workers, ETHIOPIA: 'Südabessinien' (*Ilg*) (MHN, Geneva) [examined]. **Syn. n.**

Tetramorium sericeiventre subsp. *femoratum* Emery, 1895: 37. Syntype workers, SOUTH AFRICA: Makapan (*E. Simon*) (probably in MCSN, Genoa). **Syn. n.**

Tetramorium neuvillei Forel, 1907*c*: 135. Syntype workers, ETHIOPIA: Diré Daoua, 1905 (*M. de Rothschild*) (MHN, Geneva) [examined]. **Syn. n.**

Tetramorium blochmanni subsp. *continentis* Forel, 1910*b*: 426. Syntype workers, SOUTH AFRICA: Natal (*Wroughton*) and Natal (*Haviland*) (MHN, Geneva) [examined]. **Syn. n.**

Tetramorium sericeiventre var. *inversa* Santschi, 1910*a*: 384. Syntype workers, CONGO: Brazzaville & M'Pila (*A. Weiss*) (NM, Basle; MRAC, Tervuren) [examined]. **Syn. n.**

Tetramorium blochmanni var. *nigriventre* Stitz, 1910: 144. Syntype workers, CAMEROUN: Misahöhe (*Smend*) (MNHU, Berlin) [examined]. **Syn. n.**

Tetramorium sericeiventre st. *cinnamomeum* Santschi, 1918*a*: 124 [attributed to Arnold; diagnosis in key]. Syntype workers, MOZAMBIQUE: Amatongas Forest, ii.1917 (*G. Arnold*) (NM, Bulawayo; BMNH; NM, Basle; MRAC, Tervuren) [examined]. [Later also described as new by Arnold, 1926: 249 from same material.] **Syn. n.**

Tetramorium sericeiventre var. *hori* Santschi, 1918*a*: 125. Syntype workers, SUDAN: Khartoum, 1895 (*Karawayew*) (NM, Basle) [examined]. **Syn. n.**

Tetramorium sericeiventre var. *arenarium* Santschi, 1918*a*: 126. Syntype workers, TUNISIA: Kairouan (*Santschi*) (NM, Basle) [examined]. **Syn. n.**

Tetramorium sericeiventre var. *bipartita* Santschi, 1918*a*: 126. Holotype worker, KENYA (*Le Moult*) (NM, Basle) [examined]. **Syn. n.**

Tetramorium sericeiventre var. *munda* Santschi, 1918*a*: 127. Syntype workers, GUINEA: Kakubime (in text; data label on syntypes gives Kalulima) (*Silvestri*) (NM, Basle) [examined]. **Syn. n.**

Tetramorium sericeiventre var. *jasonis* Santschi, 1918*a*: 127. Syntype workers, females, IVORY COAST: Jacqueville (*Lohier*) and Dimbroke (*Le Moult*) (NM, Basle) [examined]. **Syn. n.**

Tetramorium sericeiventre var. *vascoi* Santschi, 1918*a*: 128. Syntype worker, female, RHODESIA: Bulawayo, 14.xii.1912 (*G. Arnold*) (NM, Basle) [examined]. **Syn. n.**

Tetramorium sericeiventre var. *gamaii* Santschi, 1918*a*: 128. Syntype workers, RHODESIA: Gwari, 1912 (*G. Arnold*) (NM, Basle; BMNH) [examined]. **Syn. n.**

Tetramorium sericeiventre st. *femoratum* var. *transversa* Santschi, 1918*a*: 128. Holotype worker, SOUTH AFRICA: Transvaal, Pretoria, 1915 (*C. Brain*) (probably in NM, Basle). [Name unavailable.]

Tetramorium sericeiventre st. *femoratum* var. *colluta* Santschi, 1918*a*: 129. Holotype worker, SOUTH AFRICA: Natal, Durban (*F. Demarchi*) (NM, Basle) [examined]. [Name unavailable.]

Tetramorium sericeiventre st. *inversa* var. *defricta* Santschi, 1918*a*: 129. Syntype workers, RHODESIA: Malundi, 1914 (*G. Arnold*) (NM, Basle) [examined]. [Name unavailable.]

Tetramorium sericeiventre st. *continentis* var. *platonis* Santschi, 1918*a*: 130. Syntype workers, BOTSWANA (*Wroughton*) (NM, Basle) [examined]. [Name unavailable.]

Tetramorium sericeiventre st. *continentis* var. *georgei* Santschi, 1918*a*: 131. Syntype workers, female, male, RHODESIA: Bulawayo (*G. Arnold*) (NM, Basle) [examined]. [Name unavailable.]

Tetramorium sericeiventre var. *vividum* Santschi, 1926: 242. Syntype workers, MOZAMBIQUE: Busi Riv., Inhangovu, 3.vi.1920 (*G. Arnold*) (NM, Bulawayo; NM, Basle) [examined]. **Syn. n.**

Tetramorium sericeiventre st. *inversum* var. *evidens* Santschi, 1928*a*: 206. Syntype workers, ZAIRE: Kondué (*E. Luja*) (NM, Basle) [examined]. [Name unavailable].

Tetramorium sericeiventre st. *continentis* var. *gladiator* Santschi, 1928*a*: 206. Syntype workers, RHODESIA: Vumba Mts, Cloudland, 6000 ft [1830 m], 6–17.iv.1923 (*G. Arnold*) (NM, Bulawayo; NM, Basle) [examined]. [Name unavailable.]

Tetramorium sericeiventre st. *femoratum* var. *kenyense* Santschi, 1933: 106. Syntype workers, female, KENYA: Kiambou (*R. H. Le Pelley*) (NM, Basle) [examined]. [Name unavailable.]

Atopula hortensis Bernard, 1948: 173, fig. 9. Syntype workers, females, males, LIBYA: Fezzân, v.1945; Fezzân, Sebha, 2.vi.1944 (*Bernard*); Sebha, 1945 (*Bernard*); Fezzân, El Jedîd; Brak, 15.vi.1945 (*Mestre*) (selected syntypes in MCZ, Cambridge) [examined]. [Synonymy by Bolton, 1976: 363.]

WORKER. TL 3·3–4·4, HL 0·80–1·00, HW 0·68–0·86, CI 82–89, SL 0·72–0·92, SI 101–118, PW 0·48–0·66, AL 0·94–1·34 (100 measured).

Mandibles longitudinally striate, usually strongly so. Anterior clypeal margin arcuate and entire, without trace of a median notch or impression; median clypeal carina distinct. Frontal carinae feebly developed and short, usually ending at about the level of the midlengths of the eyes but commonly even shorter. Sometimes the frontal carinae scarcely extend any distance behind the frontal lobes and only rarely do they extend beyond midlength of eye level. Antennal scrobes absent. Antennal scapes long, SI > 100, usually markedly greater. Maximum diameter of eye in range 0·16–0·22, about 0·24–0·27 × HW. Propodeum armed with a pair of spines. Metapleural lobes elongate-triangular, usually about equal in length to the propodeal spines or slightly shorter, and running roughly parallel to them. Petiole in profile with an elongate-rectangular node which is quite low, the dorsal length distinctly greater than the tergal height. In dorsal view the node longer than broad. Sculpture of head basically a very fine and very dense reticulate-punctulation which gives a granular appearance under low magnification. Fine rugulae are usually present, superimposed on this granular ground-sculpture. Usually the rugular sculpture consists of a narrow, fine longitudinal component on the dorsum (the area between the frontal carinae and immediately posterior to it) and a fine narrow reticulum occipitally and on the sides both in front of, behind and commonly also above the eyes. The intensity and extent of the rugular sculpture varies from series to series but apparently is never completely effaced, and in some series the rugulae are quite sharply defined. Dorsal surfaces of alitrunk, petiole and postpetiole densely reticulate-punctulate or granular, at least the alitrunk also with fairly conspicuous rugae which are predominantly or entirely longitudinal on the pronotum, where they are most strongly developed. Behind this level the rugae become weak or disorganized, or may even be effaced. Where present on the propodeum they may be longitudinal, transverse, oblique or even feebly reticulate. Sculpture of first gastral tergite very variable. Usually a very fine and incredibly dense punctulation, a blanket-shagreening, or an extremely dense reticulate-coriaceous mat. In many series the individual components may be aligned so that their edges form exceptionally fine costulae, which may be longitudinal, transverse, oblique, arched or whorled in pattern. Extent of sculpture on the first tergite is also variable. Generally the entire sclerite is covered but at least the basal third is sculptured, all intermediate stages are known. Standing stout pilosity present on all dorsal surfaces of the head and body except the propodeum, but sparse. In general the promesonotum with 4–6 pairs but these are easily lost by abrasion so that some show only 1 or 2 pairs. Petiole and postpetiole each with 1–2 pairs, more rarely with 3 pairs. Scapes and tibiae only with fine appressed pubescence. Colour dull red, varying from yellowish to dark; the gaster usually black and darker than the head and alitrunk, more rarely about the same colour.

T. sericeiventre is probably the most successful African member of its genus outside the rainforest zones. It is distributed across North Africa into the Arabian peninsula, and southwards to the Cape, occurring virtually everywhere that the soil is sandy or well-drained and there is no complete tree-canopy cover. In the forest zones it occurs in clearings and on paths or dirt roads which receive some direct insolation; nesting in the soil. In terms of numbers of specimens and numbers of series in collections it is probably safe to say that *sericeiventre* is more common than all the other members of this group together. Some aspects of its biology and ecology have been investigated by Lévieux (1972), who gives a good outline of the predatory nature of this species.

The closest relatives of *sericeiventre* are *gladstonei* and *quadrispinosum*, the three together being characterized by their joint lack of hairs on the propodeal dorsum, appendages, and sides of the head behind the eyes. Details of their separation from each other are given under *gladstonei* and *quadrispinosum*.

The synonymy above lists 25 names, of which 13 are attributable to a single paper by Santschi (1918*a*), who can quite fairly be accused of thoroughly over-doing it as these infraspecific taxa are based mainly on minute (and inconsistent) differences in colour and gastral sculpture, which are irrelevant.

MATERIAL EXAMINED

Algeria: Biskra (*G.C.C.*). **Tunisia**: Kairouan (*Santschi*). **Southern Yemen**: Aden (*N. A. Weber*). **Saudi Arabia**: Jidda (*G. L. Bates*). **Mali**: Gao (*P. M. Room*); Macina (*D. R. Reynolds*). **Upper Volta**: Ougadougou (*P. M. Room*). **Sudan**: Khartoum (*N. A. Weber*), Khartoum (*J. E. M. Mellor*); Shambat (*J. E. M. Mellor*); Khartoum (*H. W. Bedford*); Khartoum (*C. Sweeney*); Kadugli (*C. Sweeney*); Imatong Mts (*N. A. Weber*); Torit, Equatoria (*N. A. Weber*). **Ethiopia**: Dire Daura (*K. Guichard*); Eritrea, Amba Derho (*Muller*). **Somalia**: Duca Abruzzi (*Miss. Ent. Paolo*). **Kenya**: Rift Valley, 25 m N. Magadi (*E. S. Ross & R. E. Leech*); no loc. (*R. H. le Pelley*); Diani Beach (*N. L. H. Krauss*); Mombasa (*N. A. Weber*); Eburru (*N. A. Weber*); Kibweze (*N. A. Weber*). **Uganda**: Kaberamaido (*E. S. Ross & R. E. Leech*); N. Turkana (*Rift Vall. Expd.*). **Tanzania**: Dodoma (*W. M. Mann*); Iringa (*E. S. Ross & R. E. Leech*); Umbulu (*W. M. Mann*); Arusha (*W. M. Mann*); Dar-es-Salaam (*M. Grabham*); Zanzibar (*M. J. Way*); Shinyanga (*O. W. Richards*); Tanga, Mlingano (*R. C. H. Sweeney*); Serengeti, Seronera (*Ross & Leech*); Mbeya (*H. Kirby*). **Liberia**: Harbel (*W. M. Mann*). **Senegal**: nr Dakar (*W. L. Brown*). **Ivory Coast**: Orstom Sta, Abidjan (*W. L. Brown*). **Ghana**: Asesewa (*B. Bolton*); Dahwhenya (*C. A. Collingwood*); Tafo (*B. Bolton*); Krobo (*Strickland*); Mampong (*P. M. Room*); Legon (*D. Leston*); Besuso (*D. Leston*); Larteh (*D. Leston*). **Nigeria**: Gambari (*B. Bolton*); Bauchi (*Walker*); Ile-Ife (*J. T. Medler*); Gusau (*J. T. Medler*); Gambari (*B. Taylor*); Mokwa (*C. Longhurst*); Ibadan (*B. R. Critchley*); Ibadan (*W. Gotwald & R. Schaefer*); Nsukka (*W. Gotwald & R. Schaefer*). **Cameroun**: Nkolbisson (Paris coll.). **Gabon**: Makokou (*I. Lieberburg*). **Zaire**: Popokabaka (*E. S. Ross & R. E. Leech*); Luluabourg (*E. S. Ross & R. E. Leech*); Albertville (*J. C. Bradley*); Yangambi (*N. L. H. Krauss*); Thysville (*H. O. Lang*); Stanleyville (*H. O. Lang*); Garamba (*H. O. Lang*). **Angola**: Kopeio (*T. D. A. Cockerell*); Bruco (*D. Hollis*). **Malawi**: no loc. (*C. W. R. McCreary*). **Zambia**: N'Changa (*C. T. Macnamara*); Mwengwa (*H. Dollman*). **Mozambique**: Beira (*G. Arnold*); Beira (*M. Grabham*). **Botswana**: Shorobe (*A. Russell-Smith*); Maitangwe (*Vernay-Lang*). **Rhodesia**: Bulawayo (*G. Arnold*); Malindi (*G. Arnold*); Matapos (*G. Arnold*); Salisbury (*G. Arnold*); Salisbury (*G. H. Bunzli*); Vumba Mts (*G. Arnold*); Umtali (*G. Arnold*); Victoria Falls (*G. Arnold*). **Lesotho**: Mamathes (*C. Jacot-Guillarmod*). **South West Africa**: Maltahoe, Sesriem Farm (*P. Hammond*); Kabulabula (*G. W. Son*). **South Africa**: Transvaal, Barberton (*T. S. Parsons*); Transvaal, Saltpan (*H. O. Lang*); Natal, Weenen (*G. Arnold*); Umbogintwini (*A. B. M. Wilnall*); no loc. (*C. B. Cooper*); Durban (*G. Arnold*); Dukuduku For. Res. (*W. L. & D. E. Brown*); Umkomaas R., nr Richmond (*W. L. & D. E. Brown*); Pietermaritzburg (*W. L. & D. E. Brown*); nr Mkuze (*W. L. & D. E. Brown*); Pretoria (*C. K. Brain*); Mtunzini (*A. J. M. Carnegie*).

Tetramorium xuthum sp. n.

Holotype worker. TL 3·3, HL 0·74, HW 0·62, CI 84, SL 0·70, SI 113, PW 0·46, AL 0·94.

Mandibles strongly longitudinally striate. Anterior clypeal margin entire. Median clypeal carina sharp and distinct. Frontal carinae short and feeble, divergent and ending at the level of the anterior margins of the eyes. Antennal scrobes absent, the head evenly convex across the eyes. Antennal scapes long, SI > 100. Maximum diameter of eye 0·18, about 0·29 × HW and with 11–12 ommatidia in the longest row. Propodeum armed with a pair of short triangular teeth which are distinctly shorter than the upcurved triangular metapleural lobes. Petiole in profile elongate-nodiform, the length of the dorsum greater than the height of the tergal portion. In dorsal view the node long and narrow, distinctly much longer than broad. Dorsum of head with fine longitudinal rugulae which are only feebly developed but are quite dense. Spaces between them with a very fine superficial punctulate ground-sculpture. Dorsal alitrunk finely and densely longitudinally rugulose on the promesonotum, the rugulae more disorganized on the propodeum but everywhere with fine superficial punctulate ground-sculpture. Petiole and postpetiole delicately rugulose and punctulate. First gastral tergite shagreened and opaque basally. All surfaces of head and body densely clothed with a pelt of short, fine, acute hairs which even arise on the sides of the alitrunk and from between the facets of the eyes. Sides of head behind eyes with abundant projecting hairs, too many to be counted easily with the head in full-face view. Antennal scapes and dorsal (outer) surfaces of middle and hind tibiae similarly clothed in a dense pelt of short, fine suberect to subdecumbent hairs. Colour uniform dark brown.

Paratype worker. TL 3·4, HL 0·74, HW 0·62, CI 84, SL 0·72, SI 116, PW 0·46, AL 0·92. As holotype.

Holotype worker, **Ghana**: Tafo, 15.ix.1970, on bare ground in bright sunlight (*B. Bolton*) (BMNH).
Paratype. 1 worker with same data as holotype (MCZ, Cambridge).

A very conspicuous species of the *bequaerti*-complex of this group, *xuthum* is immediately separable from other members of the complex (*bequaerti, bulawayense, hortorum*) by its exceptionally dense pilosity, short dentiform propodeal armament and dark colour. In the other three species standing hairs on the scapes and tibiae are short, stout and blunt, and are quite sparse, there being distinct gaps between one hair and the next. In *xuthum*, on the other hand, these hairs are densely packed together and are fine and acute.

So far as is known *xuthum* is the only member of the *bequaerti*-complex which occurs in West Africa. When first found the workers were running about in bright sunlight and attacking workers of a *Pheidole* species to which they had a close superficial resemblance. The *Pheidole* were seized and carried off by *xuthum*, not just attacked.

The *camerunense*-group

(Figs 112–120)

Antennae with 12 segments. Sting appendage triangular, dentiform or pennant-shaped. Mandibles generally smooth and shining, less commonly delicately striate. Anterior clypeal margin with a median notch or impression, usually inconspicuous or shallow but absent in only one species (*amissum*). Frontal carinae long and fine, reaching beyond level of posterior margins of eyes, sometimes approaching occipital margin. Antennal scapes relatively short, SI < 90. Scrobes very poorly developed, at most a shallow impression in the sides below the frontal carinae; commonly vestigial. With head in full-face view the sides convex (Figs 117–120), the head not roughly rectangular in outline. Propodeum with a pair of spines which, though narrow and short in some species, are always longer than the metapleural lobes. Clypeus with three carinae (median and a flanking pair), generally without other sculpture. Dorsum of head finely longitudinally rugulose, without cross-meshes and never having an occipital rugoreticulum. Pedicel segments unsculptured or only with faint sculpture in *camerunense*-complex; one or both segments strongly sculptured in *lucayanum*-complex. All dorsal surfaces of head and body with numerous standing hairs but dorsal (outer) surfaces of hind tibiae with decumbent to appressed pubescence only, except in *amissum* and *tychadion* where predominantly suberect pubescence is present.

The 12 species currently known in this group fall into two dissimilar-sized complexes which may have had independent origins and come to resemble one another by convergence. The first of these, the *lucayanum*-complex, contains the four species *amissum, lucayanum, tychadion* and *versiculum*, characterized by having the pedicel segments sculptured, usually strongly so, and by having the mandibles striate. Of these four *amissum* and *tychadion* have the dorsal (outer) surface of the hind tibiae with standing pubescence, and *amissum* is unique in the group in that it does not have a notched anterior clypeal margin.

The remaining eight species are placed in the *camerunense*-complex, containing *browni, camerunense, gegaimi, hapale, ictidum, luteipes, miserabile* and *ubangense*, characterized by having the pedicel segments unsculptured or nearly so, and by having the mandibles smooth and shining (except in *luteipes*). For convenience the complex can be further divided by colour, as *camerunense, hapale, ictidum* and *ubangense* are uniformly dark brown or black everywhere, whereas the other four are partially (head plus alitrunk) or entirely yellowish or light yellow-brown.

All members of the group are fairly uncommon and collections of them usually consist of only one or two workers in each series. Several are known only from a single series and some from only a single worker. Despite this paucity of material the group is known to be very widespread in Africa and it is possible that the species described here represent a remnant of a once more successful group which has now been pushed into the background by newly developed groups.

Tetramorium amissum sp. n.

(Fig. 113)

HOLOTYPE WORKER. TL 3·5, HL 0·82, HW 0·72, CI 88, SL 0·61, SI 85, PW 0·52, AL 0·94.

Mandibles longitudinally striate. Anterior clypeal margin with a narrow median apron but without a median impression. Median clypeal carina strong on anterior two-thirds but posteriorly weak. Frontal carinae elongate, running back well beyond the level of the posterior margins of the eyes and merging into the occipital rugular sculpture. Eyes moderate, maximum diameter 0·16, about 0·22 × HW and with 9 ommatidia in the longest row. With the alitrunk in profile the metanotal groove forming a conspicuous U-shaped concavity in the dorsal outline. Propodeal spines straight, narrow, elevated, much longer than the broadly triangular metapleural lobes. Petiole in profile with an elongate anterior peduncle and a fairly stout node, the dorsal length of which is less than the height of the tergal portion. In dorsal view the node is distinctly broader than long. Dorsum of head with irregular but strongly developed longitudinal rugae which are quite widely spaced, there being 10–11 of them between the frontal carinae at the level of the eyes. Close to the occipital margin a very few cross-meshes are present but there is no occipital rugoreticulum developed. Sides of head between eye and frontal carina less strongly but more irregularly rugose. Ground-sculpture of head faint and superficial so that the surfaces between the rugae are polished and glossy. Dorsal alitrunk coarsely, densely irregularly rugose, without a defined rugoreticulum but with numerous transverse components which are as strongly developed as the longitudinals. Ground-sculpture vestigial, almost effaced. Dorsal surfaces of petiole and postpetiole finely rugulose, the rugulae sharply defined, irregular on the petiole but predominantly longitudinal on the postpetiole. First gastral tergite absolutely smooth. All dorsal surfaces of head and body with numerous standing hairs, the longest of those on the alitrunk distinctly longer than the maximum diameter of the eye. Hairs on ventral surface of head markedly finer than those on dorsum; one pair, which is situated just behind the buccal cavity, very long, exceeding those on the dorsal alitrunk. Dorsal (outer) surfaces of hind tibiae with suberect to subdecumbent fine, fairly long pubescence. Shorter subdecumbent pubescence also present on scapes. Head, alitrunk and appendages glossy dull yellow, the gaster dark brown.

Holotype worker, **Zaire** ('B. Congo' on data label): Lwiro River, 47 km N. Bukavu, 1950 m, 27.viii.57 (*E. S. Ross & R. E. Leech*) (CAS, San Francisco).

T. amissum is a member of the *lucayanum*-complex and as such it has strongly sculptured pedicel segments and striate mandibles. Only two species in the complex, and indeed in the group as a whole, have raised pubescence on the outer tibial surface, *amissum* and *tychadion*. This single character isolates them but it is interesting to note that both of them belong in the *lucayanum*-complex. The two differ as follows.

amissum	*tychadion*
Median clypeal impression absent.	Median clypeal impression present.
Pronotal dorsum irregularly rugose.	Pronotal dorsum longitudinally rugose.
Metanotal groove deeply impressed.	Metanotal groove vestigial.
Petiole in dorsal view broader than long.	Petiole in dorsal view longer than broad.

Head and alitrunk yellow, gaster dark brown.	Entire ant uniform dark brown.
Ventral surface of head with a pair of extremely long fine hairs immediately behind the buccal cavity.	Ventral surface of head without long hairs immediately behind the buccal cavity.

Tetramorium browni sp. n.

Holotype worker. TL 2·8, HL 0·69, HW 0·63, CI 91, SL 0·45, SI 71, PW 0·40, AL 0·74.

Mandibles smooth and shining with scattered pits. Anterior clypeal margin with a small median notch. Median clypeal carina sharp and distinct, flanked by a pair of weaker carinae, otherwise clypeus unsculptured. Frontal carinae narrow and very fine, extending back almost or quite to the occipital margin without becoming confused with the other cephalic sculpture. Eyes moderate, maximum diameter 0·14, about 0·22 × HW and with 9 ommatidia in the longest row. Dorsum of alitrunk evenly shallowly convex in profile. Propodeal spines acute, more or less straight, rapidly tapering from base to acute apex and distinctly longer than the triangular, slightly upcurved metapleural lobes. Node of petiole in profile higher than long, with both antero- and posterodorsal angles bluntly but narrowly rounded. In dorsal view the petiole node slightly broader than long, rounded, the dorsum curved into the sides and the anterior and posterior faces, without a low rim or crest separating dorsum from sides or anterior face. Dorsum of head quite regularly, very finely longitudinally rugulose; the rugulae quite sharply defined though narrow, and with 11–12 between the frontal carinae at eye level. Ground-sculpture minimal on the dorsum, merely a very faint superficial pattern, the surfaces glossy. Sides of head between eye and frontal carina with a more conspicuous punctulate ground-sculpture traversed by a few faint rugulae. Occipital area without a rugoreticulum. Pronotum with a sharp transverse crest separating dorsum from anterior declivity, the anterior portion of the dorsum behind the crest with regularly spaced sharp longitudinal rugulae. On the posterior portion of the pronotum, the mesonotum and the propodeum the rugulae becoming progressively fainter and more disorganized, with some cross-meshes and anastomoses. Ground-sculpture virtually absent on pronotum but becoming stronger posteriorly where it forms a weak, superficial punctulation only; all surfaces glossy. Petiole, postpetiole and gaster unsculptured. All dorsal surfaces of head and body with numerous fine standing hairs which are acute apically; the longest of those on the alitrunk distinctly longer than the maximum diameter of the eye. Tibiae of middle and hind legs only with minute decumbent to appressed pubescence. Colour glossy dull yellow, the gaster brown.

Paratype workers. TL 2·6–2·9, HL 0·64–0·70, HW 0·58–0·66, CI 90–94, SL 0·42–0·48, SI 71–75, PW 0·38–0·43, AL 0·72–0·82 (6 measured). Maximum diameter of eye 0·12–0·14, about 0·21–0·23 × HW. Dorsum of head with 11–13 rugulae between frontal carinae at eye level; the eye with 8–9 ommatidia in the longest row. In some the rugulae on the anterior pronotum are not nearly as regularly organized as in the holotype.

Holotype worker, **Ghana**: Tafo, 21.x.1970, rotten log (*B. Bolton*) (BMNH).

Paratypes. 6 workers with same data as holotype (BMNH; MCZ, Cambridge; NM, Basle).

Non-paratypic material examined. **Ghana**: Kade (*J. Majer*); Tafo (*B. Bolton*); Asamankese (*P. Room*); Wiawso (*D. Leston*); Adeiso (*D. Leston*).

Included as non-paratypic material are five other samples each from a different locality and each represented by only a single individual. In most of these the pronotal sculpture is by no means as regular as in the holotype, but in each case it is noticeably more regular and more widely (and usually more evenly) spaced than the rugulae occurring more posteriorly on the alitrunk.

Of the four yellowish (as opposed to uniform dark brown) species of the *camerunense*-complex one, *luteipes*, has finely striate mandibles. The remaining three, *gegaimi*, *browni* and *miserabile*, have smooth or virtually smooth mandibular blades. In *gegaimi* the petiole in dorsal view has the anterior face bordered by a narrow ridge or crest which separates dorsum from anterior face; this feature is absent in *browni* and *miserabile*, where all faces of the node round into the dorsum. Also, in *gegaimi* pronotal sculpture is a rugoreticulum, as opposed to the longitudinal organization seen in the other two. In *browni* the hairs on the dorsal alitrunk are elongate, acute apically and fine, the longest of these hairs distinctly longer than the maximum diameter of the eye. In contrast the alitrunk pilosity of *miserabile* is short, stout and blunt, all the hairs being markedly shorter than the eye diameter.

Tetramorium camerunense Mayr

Tetramorium camerunense Mayr, 1895: 129. Syntype workers, CAMEROUN (*Brauns*) (NM, Vienna) [examined].

WORKER. TL 2·7–3·1, HL 0·72–0·78, HW 0·64–0·70, CI 87–90, SL 0·50–0·56, SI 78–81, PW 0·43–0·46, AL 0·78–0·84 (6 measured).

Mandibles smooth and shining with scattered small pits. Anterior clypeal margin with a small but quite distinct median impression. Median clypeal carina sharp and conspicuous, flanked by another carina on each side but otherwise the clypeus unsculptured. Frontal carinae fine but sharp, reaching back almost to the occipital margin in some cases, but sometimes ending before it or becoming confused with the remaining cephalic sculpture. Maximum diameter of eyes 0·14–0·17, about 0·22–0·24 × HW. Propodeal spines short and narrow, usually longer than the low, broadly angular metapleural lobes. Petiole node in profile narrowing from base to apex so that the dorsal length is less than the height of the tergal portion, the posterior face less steeply sloping than the anterior. In dorsal view the node broader than long. Dorsum of head with sparse, widely spaced, sharply developed fine longitudinal rugulae, the spaces between which are almost completely smooth and highly polished. Ground-sculpture as such is absent but under the right lighting conditions an exceptionally faint fine superficial pattern can be seen. Occipital region of head without a rugoreticulum though one or two anastomoses may be present close to the margin. Dorsal alitrunk finely irregularly rugulose, predominantly longitudinal on the pronotum; ground-sculpture between the rugulae almost or quite effaced. Dorsal surfaces of petiole and postpetiole unsculptured and smooth, or sometimes the petiole may retain very faint vestiges of punctulae. First gastral tergite unsculptured. All dorsal surfaces of head and body with numerous fine, acute standing hairs, the longest of those on the dorsal alitrunk about equal to the maximum eye diameter. Hind tibiae with short decumbent to appressed pubescence. Colour uniform blackish brown to black, the appendages lighter.

Amongst the four uniformly dark-coloured species of the *camerunense*-complex this species is quickly separable by its possession of sharply defined, spaced-out cephalic rugulae without ground-sculpture between them. In all three related species (*hapale, ictidum, ubangense*) the rugulae are less well-defined on the head and the spaces between them have a conspicuous punctulate or granular ground-sculpture.

MATERIAL EXAMINED

Ghana: Tafo (*B. Bolton*); Mampong (*D. Leston*).

Tetramorium gegaimi Forel **stat. n.**

(Figs 115, 117)

Tetramorium camerunense var. *gegaimi* Forel, 1916: 421. Syntype workers, female, ZAIRE: St Gabriel (*Kohl*) (MHN, Geneva) [examined].

WORKER. TL 2·4–2·6, HL 0·60–0·64, HW 0·54–0·58, CI 90–91, SL 0·41–0·45, SI 76–77, PW 0·36–0·38, AL 0·68–0·72 (2 measured).

Mandibles smooth, with scattered pits. Anterior clypeal margin notched or impressed medially; the median clypeal carina running the length of the clypeus. Frontal carinae running back almost to occiput but much weaker in their posterior one-third than anteriorly. Eyes moderate in size, maximum diameter 0·12–0·14, about 0·22–0·24 × HW. With head in full-face view the occipital margin almost transverse, only extremely feebly concave, sides of head shallowly but evenly convex. Dorsum of alitrunk quite evenly convex in profile, showing only a very faint impression at the metanotal groove. Propodeal spines narrow and acute, the metapleural lobes triangular. Petiole in profile as in Fig. 115, in dorsal view the petiole with a narrow transverse crest or ridge bordering the anterior face. Postpetiole globular in dorsal view. Dorsum of head finely longitudinally rugulose, with 8–10 rugulae between the frontal carinae at the level of the eyes; posteriorly the rugulae with some anastomoses and a few feeble cross-meshes, but without a reticulum. Dorsal alitrunk irregularly rugulose, forming a weak reticulum or broken reticulum on the promesonotum. Petiole, postpetiole and gaster unsculptured or at most the petiole with vestigal marks which are almost effaced. All dorsal surfaces of head and body with numerous blunt hairs, but the scapes and dorsal (outer) surfaces of the mid and hind tibiae only with short appressed pubesence. Head and alitrunk light brownish yellow, the gaster distinctly darker, mid to dark brown.

Amongst the species of this group which have the gaster darker in colour than the head and alitrunk, as opposed to being of a uniform dark brown, *gegaimi* is most closely related to *browni* and *miserabile*, but in both these species the pronotal dorsum is quite regularly longitudinally rugulose whilst in *gegaimi* a weak rugoreticulum is present. Secondly, with the petiole in dorsal view *gegaimi* shows a flat anterior face bordered by a narrow ridge, whereas in *browni* and *miserabile* the anterior face of the petiole is rounded and without a bordering ridge.

Tetramorium hapale sp. n.

HOLOTYPE WORKER. TL 3·0, HL 0·75, HW 0·64, CI 85, SL 0·54, SI 84, PW 0·46, AL 0·82.

Mandibles smooth and shining with scattered small pits. Anterior clypeal margin with a shallow median impression. Median clypeal carina sharp and distinct, running the length of the clypeus and flanked on each side by 1–2 much feebler rugulae, without other sculpture. Frontal carinae fine but more strongly developed than other cephalic sculpture, running back well beyond the level of the posterior margins of the eyes but fading and merging with the rugular sculpture of the occipital region before reaching the margin. Maximum diameter of eye 0·14, about 0·22 × HW and with 7 ommatidia in the longest row. Dorsal alitrunk evenly convex, not impressed at the metanotal groove. Propodeum armed with a pair of short, straight spines which are slightly longer than the elongate-triangular metapleural lobes. Petiole in profile with a narrow, more or less straight anterior peduncle. Petiole node with dorsal surface about as long as the tergal portion is high, anterodorsal angle roughly right-angled, the posterodorsal angle blunter. In dorsal view the petiole node longer than broad and with a conspicuous transverse ridge or crest running across the anterior face; the crest is continuous with a lateral raised ridge which runs diagonally across each side of the node. Dorsum of head with very fine irregular weak longitudinal rugulae, the spaces between them with a dense and conspicuous punctulate-granular ground-sculpture. Occipital region of head with a few anastomoses or cross-meshes, especially laterally, but without a rugoreticulum. Sides of head between eye and frontal carinae as strongly punctulate-granular as dorsum but the rugulae in this area much weaker. Dorsal alitrunk with scattered, disorganized, very weak rugulae. Ground-sculpture almost effaced on pronotum, much weaker than on head, but posteriorly on alitrunk the ground-sculpture strengthening. Petiole dorsum with very scattered, virtually effaced vestiges of rugular sculpture, postpetiole and gaster smooth and shining. All dorsal surfaces of head and body with numerous standing hairs, the longest of those on the alitrunk about equal to the maximum diameter of the eye. Scapes and tibiae only with short appressed pubescence. Colour uniform mid-brown but the appendages yellow.

Holotype worker, **Ivory Coast**: Banco Forest, nr Abidjan, 11.i.1963, no. A50 (*W. L. Brown*) (MCZ, Cambridge).

The four uniformly dark-coloured species of the *camerunense*-complex (*camerunense, hapale, ictidum, ubangense*) form a tetrad of closely related species. *T. camerunense* stands out fairly well from this collection as it lacks dorsal cephalic ground-sculpture and the petiole node in dorsal view either lacks the transverse anterior crest or at most has it very reduced and almost invisible. In the other three species the dorsal cephalic ground-sculpture is dense and conspicuous, either densely reticulate-punctate or punctulate-granular; also the transverse anterior crest on the petiole dorsum is present and usually very distinctive. *T. ubangense* is distinguished from both *hapale* and *ictidum* by being a larger species (HW 0·78 as opposed to HW 0·66 at maximum in the other two) and by having the petiole node broader than long in dorsal view, as opposed to its being longer than broad in the other two. Finally, *ubangense* retains delicate but fairly distinctive punctulate sculpture on the dorsal surfaces of both pedicel segments. The last two species, *hapale* and *ictidum*, separate well on measurable characters as *hapale* has a long, quite narrow head and relatively long scapes (CI 85, SI 84) whilst in *ictidum* the head is broader and the scapes relatively shorter (CI 88–92, SI 78–80).

Tetramorium ictidum sp. n.

HOLOTYPE WORKER. TL 2·8, HL 0·70, HW 0·64, CI 91, SL 0·50, SI 78, PW 0·42, AL 0·78.

Mandibles smooth and shining, with scattered minute pits. Anterior clypeal margin with a small, shallow median impression. Median clypeal carina sharp and strong, flanked by a much weaker lateral pair which may fail to reach the anterior margin. Frontal carinae fine but sharp, reaching back well beyond the level of the eyes but fading out and merging with the remaining cephalic sculpture on the occiput, not reaching the margin. Maximum diameter of eye 0·13, about 0·20 × HW and with 8 ommatidia in the longest row. Propodeum armed with a pair of short, rapidly tapering acute spines which are very slightly downcurved along their length. Metapleural lobes short and broadly triangular, distinctly shorter than the propodeal spines. Petiole in profile with the node narrowing from base to apex, the dorsal length less than the height of the tergal portion. Node of petiole in dorsal view slightly longer than broad. Dorsum of head finely longitudinally rugulose, with about 11 rugulae between the frontal carinae at eye-level. Spaces between the rugulae with a conspicuous finely punctulate or granular ground-sculpture. Occipital region with a few faint cross-meshes or anastomoses but without a reticulum except on the corners where a weak meshwork is present. Sides of head between eye and frontal carinae with fine, dense granular ground-sculpture and with reticulate rugulae, especially immediately above and behind the eye, such rugular sculpture suppressed closer to the frontal carina. Dorsal alitrunk densely and finely irregularly rugulose everywhere, forming an irregular reticulum on the pronotum but more disorganized elsewhere. Ground sculpture a weak superficial punctulation, almost effaced on the pronotum, stronger posteriorly. Dorsal surfaces of petiole and postpetiole mostly smooth but with vestigial traces of very faint punctulae. Gaster unsculptured. All dorsal surfaces of head and body with numerous quite stout hairs, the longest of those on the dorsal alitrunk and first gastral tergite shorter than the maximum eye diameter. Colour uniform dark brown, the appendages lighter.

PARATYPE WORKERS. TL 2·7–2·9, HL 0·68–0·72, HW 0·62–0·66, CI 88–91, SL 0·49–0·52, SI 78–80, PW 0·40–0·44, AL 0·76–0·81 (8 measured). As holotype but maximum diameter of eye 0·13–0·14, about 0·20–0·21 × HW, and with 10–13 longitudinal rugulae between the frontal carinae at eye level. Petiole in dorsal view with the node about as broad as long in some, otherwise slightly longer than broad as in holotype.

Holotype worker, **Cameroun**: 14 miles [23 km] E. of Douala, 80 m, 20.xi.1966 (*E. S. Ross & K. Lorenzen*) (CAS, San Francisco).

Paratypes. 8 workers with same data as holotype (CAS, San Francisco; BMNH; MCZ, Cambridge).

Of the four uniformly dark-coloured species which constitute a part of the *camerunense*-complex *ictidum* is isolated by its possession of conspicuous ground-sculpture on the dorsum of the head, relatively small size (HW 0·66 at maximum), petiole node which is as long as or slightly longer than broad dorsally, densely rugulose pronotum and relatively short broad head, CI 88–91.

Tetramorium lucayanum Wheeler

(Figs 112, 120)

Tetramorium lucayanum Wheeler, 1905: 100, fig. L. Syntype workers, BAHAMAS: New Providence, Nassau, Queen's Staircase, v–vi.1904 (*W. M. Wheeler*) (AMNH, New York) [examined].

Tetramorium camerunense var. *waelbroeki* Forel, 1909: 53. Holotype worker, ZAIRE: Kinchassa (NM, Basle) [examined]. [Synonymy by Brown, 1964*a*: 131.]

Tetramorium lucayanum var. *sexdens* Forel, 1915: 357. Syntype workers, IRELAND: Dublin, in greenhouse (MHN, Geneva; BMNH) [examined]. [Synonymy by Brown, 1964*a*: 131.]

Tetramorium rectinodis Menozzi, 1942: 176, fig. 2B. Syntype workers, FERNANDO PO: Musola, 9.ix.39; San Carlos, x.39 (*H. Eidmann*) (types lost, not in IE, Bologna). [Provisional synonymy by Brown, 1964*a*: 131; confirmed by Bolton, 1979: 172.]

WORKER. TL 2·8–3·3, HL 0·72–0·80, HW 0·64–0·72, CI 86–91, SL 0·50–0·61, SI 80–87, PW 0·44–0·54, AL 0·80–0·94 (40 measured).

Mandibles usually delicately longitudinally striate, but almost smooth in some samples. Anterior clypeal margin with a shallow weak median impression or notch. Clypeus with a strong, sharp median carina flanked by a more lateral pair of carinae, otherwise unsculptured. Frontal carinae narrow and fine but sharply developed, commonly running back almost to the occipital margin but sometimes becoming confused with the other occipital sculpture before reaching the margin. Maximum diameter of eye 0·14–0·17, about 0·21–0·24 × HW, and with 8–9 ommatidia in the longest row. Propodeum armed with a pair of elongate, narrow spines which are usually straight, rarely slightly curved. Metapleural lobes elongate and narrowly triangular, commonly spiniform in their apical portion and somewhat elevated or upcurved, less commonly almost straight. Petiole in profile with a narrow anterior peduncle, the anterior face of the node ascending vertically and meeting the dorsal face in a sharp right-angle. The posterodorsal angle of the node distinctly more rounded than this. In dorsal view the petiole node with a low but sharp crest or carina traversing the anterior face, the node longer than broad even if only slightly so, and the peduncle in dorsal view appearing very narrow indeed. Dorsum of head with widely spaced, sharply defined fine longitudinal rugulae, usually without cross-meshes but sometimes with a few meshes or anastomoses occipitally, never with a developed occipital reticulum. About 9–11 rugulae between the frontal carinae at eye-level. Spaces between the rugulae almost or completely smooth, at most with only faint traces of ground-sculpture. Dorsal alitrunk with sharply defined widely spaced longitudinal rugulae which are less regular than on the head and often a few weak cross-meshes may be present, especially on mesonotum and propodeum. Ground-sculpture between the rugulae almost or completely effaced. Petiole dorsum irregularly and quite strongly rugulose, distinctly more strongly sculptured than the postpetiole which has weak longitudinal rugulae dorsally. Gaster unsculptured. All dorsal surfaces of head and body with numerous standing hairs. Appendages only with fine short pubescence which is usually fairly dense and on hind tibiae is decumbent to appressed. Colour uniform mid-brown to black, the appendages usually somewhat lighter than the body.

The four species placed in the *lucayanum*-complex of this group all have the dorsal surfaces of both petiole and postpetiole with distinct rugulose sculpture, and usually have the mandibles finely striate. Of the four *amissum* and *tychadion* are isolated by having suberect fairly long pubescence on the dorsal (outer) surfaces of the hind tibiae. The remaining two members of the complex, *lucayanum* and *versiculum*, have decumbent to appressed short pubescence on the hind tibiae. Characters distinguishing these two closely related species are given under *versiculum*.

Apart from being quite widely distributed in West Africa *lucayanum* has also been transported by man to the Caribbean countries and is known now from Cuba, Puerto Rico, Jamaica, Virgin Islands and the Bahamas. Bolton (1979: 172) deals with the species as it occurs in the New World.

MATERIAL EXAMINED

Sierra Leone: no loc. (*Buxton*). **Guinea**: Tô (*Lamotte*). **Ghana**: Tafo (*B. Bolton*); Akosombo (*C. A. Collingwood*). **Nigeria**: Gambari (*B. Taylor*); Gambari (*B. Bolton*); Mokwa (*C. Longhurst*).

Tetramorium luteipes Santschi

Tetramorium grassii st. *luteipes* Santschi, 1910*a*: 383, fig. 11. Syntype workers, female, males, CONGO: Brazzaville (*A. Weiss*) (NM, Basle) [examined].

Tetramorium luteipes Santschi; Santschi, 1914*c*: 24 (footnote). [Raised to species.]

WORKER. TL 2·8–3·1, HL 0·67–0·78, HW 0·59–0·70, CI 88–90, SL 0·46–0·55, SI 77–78, PW 0·40–0·46, AL 0·72–0·86 (3 measured).

Mandibles finely longitudinally striate. Anterior clypeal margin with a small median notch. Median clypeal carinae strong and sharp, flanked by a pair of weaker carinae but otherwise the clypeus unsculptured. Frontal carinae weakly developed, fine and narrow, reaching back beyond the level of the eyes but fading out on the occiput and becoming indistinguishable from the other cephalic sculpture. Maximum diameter of eye 0·13–0·15, about 0·21–0·22 × HW. Propodeal spines fairly short but longer than the triangular, slightly upcurved, metapleural lobes. Petiole in profile with both antero- and posterodorsal angles blunt and the node as high as or slightly higher than long. Sides of petiole node with vestigial remains of a diagonal rugula or carina running from the anterodorsal angle posteroventrally to the site of attachment to the postpetiole. Petiole node in dorsal view as broad as or slightly broader than long. Dorsum of head with fine, narrow and fairly indistinct irregular longitudinal rugulae, 11–13 of which are present between the frontal carinae at eye level. In the occipital region a few very feeble anastomoses are present but no rugoreticulum is developed. Ground-sculpture a feeble and superficial punctulation or granulation, almost effaced in places, the surfaces glossy. Sides of head between eye and frontal carinae with some sparse, weak rugulation and with a fairly distinct punctulate ground-sculpture which is much more obvious than on the dorsum. Dorsal alitrunk finely irregularly rugulose, the longitudinal component tending to predominate but with numerous cross-meshes, anastomoses or meanders. Dorsal surfaces of petiole and postpetiole to all intents and purposes unsculptured, with only the very faintest superficial vestiges of sculpture remaining. First gastral tergite smooth and shining. All dorsal surfaces of head and body with numerous, relatively short standing hairs, those on the alitrunk, pedicel segments and gaster shorter than the maximum diameter of the eye. Hind tibiae only with short, fine, decumbent to appressed pubescence. Colour light yellowish brown, the gaster slightly darker, the legs lighter.

One of the four known light-coloured (yellowish) species belonging in the *camerunense*-complex of this group, together with *gegaimi, miserabile* and *browni, luteipes* is the only one which has the mandibles distinctly striate. In *gegaimi* and *browni* the mandibles are smooth with scattered pits. The mandibles of *miserabile* conform mostly to this pattern but have some faint marks between the pits which may be taken as striation. However, the petiole node in dorsal view is subglobular in *miserabile*, the dorsum rounding into the sides and the anterior and posterior faces, whereas in *luteipes* the petiole node is angular anteriorly and the dorsum is bounded anteriorly and laterally by a narrow raised rim or crest, absent in *miserabile*.

Tetramorium miserabile Santschi

(Figs 116, 118)

Tetramorium miserabile Santschi, 1918*b*: 153. Holotype worker, KENYA (*Reichensperger*) (NM, Basle) [examined].

WORKER. TL 3·1, HL 0·75, HW 0·68, CI 91, SL 0·54, SI 79, PW 0·46, AL 0·82.

Mandibles mostly smooth but with some faint marks between the pits. Median clypeal impression weakly developed. Frontal carinae quite strong, distinctly more robust than any of the cephalic sculpturation, extending back well beyond the level of the eyes but petering out on the occiput. Maximum diameter of eye 0·14, about 0·21 × HW. Occipital margin of head broadly but quite shallowly concave, the sides of the head narrowly but evenly convex. Dorsal alitrunk evenly convex in profile, the propodeal spines straight and acute. Metapleural lobes triangular and acute. Petiole in profile as shown in Fig. 116, in dorsal view subglobular, slightly broader than long, the dorsum rounding into the sides and the anterior and posterior faces. Dorsum of head feebly longitudinally rugulose, the spaces between the low, weak rugulae filled with a fairly conspicuous superficial sculpture of shagreening or punctulation. Promesonotum with only feebly defined rugulose sculpture, predominantly longitudinal in direction but low and weak, the spaces between rugulae sculptured as the head; propodeal dorsum with stronger rugulose sculpture. Petiole, postpetiole and gaster unsculptured. All dorsal surfaces of head and body with numerous quite short, blunt hairs but the scapes and hind tibiae only with fine decumbent or appressed short pubescence. Colour a uniform pale brownish yellow, the appendages slightly lighter than the body.

Of the known species related to *miserabile, luteipes* has the mandibles finely longitudinally striate, *gegaimi* has the promesonotal dorsum sculptured with a disorganized ruguloreticulum, and *browni* has the pilosity of the alitrunk different from that of *miserabile*, as indicated in the discussion of that species.

Tetramorium tychadion **sp. n.**

HOLOTYPE WORKER. TL 3·6, HL 0·84, HW 0·76, CI 90, SL 0·64, SI 84, PW 0·54, AL 0·96.

Mandibles sharply but finely longitudinally striate. Anterior clypeal margin with a small median notch. Clypeus with a sharp median carina, otherwise unsculptured on the central portion except for a pair of weaker carinae which flank the median. Frontal carinae running back beyond the level of the posterior margins of the eyes then rapidly fading out, not continued to the occipital margin like the trong rugae which run between them. Eyes of moderate size, maximum diameter 0·18, about 0·24 × HW and with 8 ommatidia in the longest row. Metanotal groove forming a very shallow impression in the dorsal alitrunk in profile. Propodeal spines long, strong and acute, straight and rapidly tapering along their length in profile. Metapleural lobes shorter, about half the length of the spines, roughly triangular and feebly upcurved. Petiole node in profile higher than long, the dorsal length less than the height of the tergal portion, and with a conspicuous oblique rugula or irregular carina which runs diagonally from the anterodorsal corner of the node to the posteroventral junction with the postpetiole. The area of the side of the node in front of this rugula unsculptured, behind it sculptured. Petiole node in dorsal view longer than broad and the diagonal rugula of the sides seen to be continuous across the anterior face as a narrow rim or crest. Dorsum of head with sharp, widely spaced strong rugae running from posterior clypeal margin to occiput; about 9–10 such rugae present between the frontal carinae at eye level. Occipital region with one or two anastomoses but without a rugoreticulum. Ground-sculpture an almost effaced granulation, the surfaces between the rugae glossy and mostly smooth. Dorsal alitrunk rugose, the components finer than those on the head, longitudinal on the pronotum but irregular or with cross-meshes elsewhere. Dorsal surfaces of petiole and postpetiole with spaced-out fine rugulae, the spaces between them shining. First gastral tergite unsculptured. All dorsal surfaces of head and body with numerous long, stout, standing hairs which are acute apically. The longest hairs on the alitrunk distinctly exceeding the maximum diameter of the eye.

Dorsal (outer) surfaces of hind tibiae with fine suberect to subdecumbent pubescence but without stout hairs such as are seen elsewhere on the body. Colour uniform dark brown, the legs somewhat lighter.

Holotype worker, **Tanzania**: Korogwe, vi.1959 (*O.R.*) (BMNH).

Of the species of the *lucayanum*-complex, characterized by having the pedicel segments distinctly sculptured and the mandibles (usually) markedly striate, the species *amissum* and *tychadion* are distinguished by possessing suberect pubescence on the hind tibiae. In the other members of the complex (*lucayanum* and *versiculum*), and in all other members of the *camerunense*-group, such pubescence is absent. The differences separating *tychadion* from *amissum* are tabulated under the latter name.

Tetramorium ubangense Santschi **stat. n.**

(Figs 114, 119)

Tetramorium camerunense var. *ubangense* Santschi, 1937*d*: 82. Holotype worker, ZAIRE: Banziville (*Augustin*) (NM, Basle) [examined].

WORKER. TL 3·5, HL 0·85, HW 0·78, CI 92, SL 0·58, SI 74, PW 0·52, AL 0·92.

Mandibles smooth and shining, with scattered small pits. Anterior clypeal margin notched or impressed medially. Median clypeal carina complete and distinct. Frontal carinae distinct though not strongly developed and tending to become confused with the cephalic sculpture about midway between the level of the posterior ocular margin and the occiput. Occiput concave in full-face view, the sides of the head shallowly but more or less evenly convex. Eyes moderate, their maximum diameter *c*. 0·17, about 0·22 × HW and distinctly greater than the maximum width of the scape. Outline shape of alitrunk and pedicel as in Fig. 114, the propodeal spines feebly downcurved along their length. Node of petiole in dorsal view broader than long, slightly broader behind than in front. Dorsum of head weakly longitudinally rugulose, the spaces between the rugulae with punctulate or punctulate-granular ground-sculpture. Promesonotal dorsum finely, weakly and quite irregularly longitudinally rugulose, the spaces between them more feebly superficially sculptured than on the head. Dorsal surfaces of both petiole and postpetiole with faint punctulate sculpture, more strongly developed on the former than the latter; both nodes with vestiges of rugulose sculpture on the sides, again stronger on petiole than postpetiole. Gaster unsculptured. All dorsal surfaces of head and body with numerous short, standing hairs but the tibiae and scapes only with fine decumbent to appressed pubescence. Colour uniform dark brown but with the mandibles, antennae and legs lighter, yellow-brown.

T. ubangense is the largest of the dark-coloured members of this complex which is known, and it has the most massively developed petiole and most strongly sculptured pedicel segments. It separates well from its closest relatives as *hapale* has a longer, narrower head (compare CI measurements) with strong sculpture between the rugulae, and the propodeal spines are not curved along their length. In *camerunense* the postpetiole is completely smooth and highly polished, and in *ictidum* the alitrunk is more coarsely and irregularly rugulose, reticulate in places, and the petiole is much smaller, the maximum width in dorsal view being *c*. 0·18 as opposed to 0·25 in *ubangense*.

Tetramorium versiculum **sp. n.**

HOLOTYPE WORKER. TL 3·4, HL 0·86, HW 0·76, CI 88, SL 0·64, SI 84, PW 0·54, AL 0·96.

Mandibles very finely longitudinally striate. Anterior clypeal margin with a small, shallow median impression. Median clypeal carina strong, flanked by a pair of carinae which are almost as strongly developed; clypeus otherwise unsculptured except for near the posterior suture where some rugae run onto the clypeus from the frons. Frontal carinae sharp and strong, running back well beyond the level of the posterior margins of the eyes but fading out and merging with the other sculpture on the occiput, some distance in front of the occipital margin. Maximum diameter of the eye 0·17, about 0·22 × HW and with 8–9 ommatidia in the longest row. Propodeal spines long, straight and narrow, much longer than the metapleural lobes; the latter elongate and narrowly triangular, more or less spiniform apically, elevated and slightly upcurved. Petiole in profile with a long anterior peduncle, the anterior face of the node rising vertically and forming a right-angle where it meets the dorsal surface. Dorsum of node in profile shallowly convex and meeting the posterior face in a blunt angle or short curve. Petiole node in dorsal view slightly longer than broad and with a narrow rim or crest running across the anterior margin. Dorsum of head coarsely sculptured with strong longitudinal rugulae, about 10 of which occur between the frontal carinae at the level of the eyes. Spaces between the rugulae with dense and conspicuous finely punctulate or granular ground-sculpture. Occipital region with a number of cross-meshes and anastomoses but without a strong rugoreticulum. Dorsal alitrunk sharply, densely and quite coarsely rugulose, the components meandering but predominantly longitudinal on the pronotum, more disorganized posteriorly. Fine granular or faint punctulate ground-sculpture present between the rugulae. Petiole dorsum finely and very densely rugulose, the components tight-packed and blanketing the surface. Dorsum of postpetiole densely and regularly longitudinally costulate or sulcate, contrasting strongly with the rough and disorganized appearance of the petiole. Gaster smooth and shining. All dorsal surfaces of head and body with numerous standing hairs; the hind tibiae only with short pubescence which is decumbent or appressed. Colour blackish brown to black.

PARATYPE WORKERS. TL 3·1–3·3, HL 0·76–0·84, HW 0·68–0·74, CI 87–90, SL 0·58–0·62, SI 83–88, PW 0·48–0·54, AL 0·85–0·96 (30 measured). As holotype but maximum diameter of eye 0·14–0·16, about 0·20–0·22 × HW and with 8–9 ommatidia in the longest row. Dorsum of head with 8–10 longitudinal rugulae between the frontal carinae at eye level. In some workers the mandibles are virtually smooth, so reduced is the striation. The rugulae on the postpetiole are predominantly transverse in some individuals.

Holotype worker, **Ghana**: Tafo, 8.ii.1970, litter sample (*B. Bolton*) (BMNH).

Paratypes. **Ghana**: 1 worker with same data as holotype. **Ivory Coast**: 42 workers, Nzi Noua, N. of Ndouci, 13.i.1977, degraded for., rot. log (*W. L. & D. E. Brown*). (BMNH; MCZ, Cambridge; NM, Basle.)

Non-paratypic material examined. **Ivory Coast**: Banco Forest, nr Abidjan (*W. L. Brown*). **Ghana**: Mepom (*D. Leston*); Okumaning (*D. Leston*); Mampong (*P. Room*).

Very closely related to *lucayanum* and sharing the delicate to indistinct mandibular sculpture and coarse petiolar sculpture of that species. The overall construction of the petiole is also the same in both species. However, *versiculum* is a much more densely and coarsely sculptured species than *lucayanum* and the following differences distinguish the two.

In *lucayanum* the postpetiole is mostly smooth, with a few weak longitudinal rugulae, whereas in *versiculum* the postpetiole is sharply and densely costulate or sulcate, with very little space between the components. Ground-sculpture on the head is virtually absent in *lucayanum* so that the spaces between the rugulae are smooth, but in *versiculum* a conspicuous punctulate or granular ground-sculpture is present. Although both species have about the same number of longitudinal rugulae on the head those in *lucayanum* are fine and quite sharp whilst those in *versiculum* are broader and coarser. This, coupled with the presence of ground-sculpture in *versiculum* makes its head look much more strongly sculptured.

The *dumezi*-group

(Figs 121–128)

Antennae with 12 segments. Sting appendage triangular to pennant-shaped. Mandibles usually smooth and shining with scattered pits but rarely delicately striate (*jauresi*). Anterior clypeal margin entire except in *jauresi*-complex where a small impression is present medially. With the head in full-face view the sides are roughly parallel and more or less straight, usually slightly impressed at the eyes but not evenly convex throughout their length (Figs 121–123). Antennal scrobes feeble or vestigial. Frontal carinae reaching back to occiput except in *nodiferum*. Scapes short, SI < 90. Propodeum armed with a pair of small teeth or merely angulate, metapleural lobes variable in shape but larger than the propodeal armament. Petiole node in dorsal view usually subglobular, as broad as or slightly broader than long. Sculpture of dorsum of head of longitudinal rugulae which are usually regular; without an occipital rugoreticulum. All dorsal surfaces of head and body with standing hairs and commonly the scapes, tibiae, or both with erect to suberect pilosity or pubescence.

To some extent this is a convenience-group but it is founded upon a solid core of five closely related species (*dumezi*-complex) and a pair of species obviously derived from this core (*meressei*-complex). Also included, however, are the three species referred here to the *jauresi*-complex which, though sharing many characters with the aforenamed complexes, have an important difference and may be separately derived.

The members of the *jauresi*-complex are separated by their possession of a median impression in the anterior clypeal margin, absent elsewhere in the group. Of the three included species two, *qualarum* and *jauresi*, are related, but *nodiferum* may resemble them by convergence. It is a very specialized form with many derived characters and this tends to obscure its relationships.

The *dumezi*-complex is the largest in the group, including *candidum*, *dumezi*, *elidisum*, *isipingense* and *pialtum*. In these the anterior clypeal margin is entire, the mandibles are smooth, pilosity on the body is relatively sparse and is usually short and fine, and the postpetiole does not have a high vertical posterior face. In some of the species standing pilosity or pubescence is present on the scapes, tibiae, or both, but is absent in *dumezi* and *pialtum*.

The two remaining species, *meressei* and *psymanum*, form the *meressei*-complex which closely resembles *dumezi* and its allies but which have abundant long soft curved acute hairs forming a dense pelt all over the body and on the legs. Apart from this the postpetiole is high, has a narrowly rounded dorsum and has a high vertical free posterior face.

***Tetramorium candidum* sp. n.**

(Fig. 124)

Holotype worker. TL 3·1, HL 0·75, HW 0·63, CI 84, SL 0·50, SI 79, PW 0·47, AL 0·90.

Mandibles smooth and shining with scattered minute pits. Anterior clypeal margin without a median notch; the clypeus with 3 widely spaced fine longitudinal carinae, the median absent on the anterior half (reaching the anterior margin in most paratypes, and some of them with an extra pair of weak carinae). Frontal carinae not stronger than cephalic rugulae, broken or interrupted near the base in holotype and most paratypes, continuous in some and uneven in others, with one side continuous, the other broken. Frontal carinae extending back beyond level of eyes but much weaker occipitally and tending to merge with the other sculpture before reaching the margin. Antennal scrobes vestigial. Maximum diameter of eye 0·16, about 0·25 × HW and with 8–9 ommatidia in the longest row. Head in full-face view with sides more or less straight and parallel, not evenly shallowly convex. Propodeum merely with an angular ridge separating dorsum from declivity in profile, or with a minute tubercle (in holotype with angular ridge on left side and minute tubercle on right side of body; in paratypes with one or the other, or with both as in holotype). Metapleural lobes elongate-triangular, elevated, narrow and acute apically, always much longer and broader than the propodeal armament. Node of petiole in profile rounded, without sharp angles, the posterodorsal angle more broadly rounded than the anterodorsal. In dorsal view the node subglobular, slightly broader than long, rounded. Dorsum of head with low, blunt but quite strongly developed longitudinal rugulae, without cross-meshes and without an occipital reticulum. Ground-sculpture almost effaced, the spaces between rugulae glossy and at most with only the faintest of superficial patterns. Dorsal alitrunk very weakly, irregularly and sparsely longitudinally rugulose on promesonotum, the sculpture almost entirely effaced. Ground-sculpture minimal and vestigial. Petiole with a few faint rugulae but postpetiole and gaster unsculptured, smooth and shining. All dorsal surfaces of head and body with numerous short fine acute hairs, the longest of which are distinctly shorter than the maximum diameter of the eye. Leading edges of antennal scapes with suberect to subdecumbent short pubescence. Dorsal (outer) surfaces of hind tibiae with erect or suberect fine short pubescence. Colour light brown, the appendages yellowish brown.

Paratype workers. TL 3·1–3·3, HL 0·74–0·80, HW 0·62–0·67, CI 82–85, SL 0·48–0·52, SI 76–79, PW 0·46–0·50, AL 0·90–0·94 (13 measured). Maximum diameter of eye 0·16–0·17, about 0·25–0·26 × HW. As holotype but with the variation noted above and with some lighter brown. In some the feeble rugulae on the dorsal alitrunk are slightly more sharply defined and the ground-sculpture of the alitrunk may be somewhat more conspicuous, though still being very feeble indeed. The petiole node in dorsal view varies from being about as broad as long to slightly broader than long.

Holotype worker, **Zaire** ('B. Congo' on data label): Lwiro River, 47 km N. of Bukavu, 1950 m, 27.viii.1957 (*E. S. Ross & R. E. Leech*) (CAS, San Francisco).

Paratypes. 13 workers and 2 males with same data as holotype (CAS, San Francisco; BMNH; MCZ, Cambridge).

In the *dumezi*-complex of this group two species, *candidum* and *isipingense*, are isolated by the possession of erect to suberect short pubescence on the hind tibiae. They also have similar pubescence on the leading edges of the antennal scapes. Other members of the complex have either short stiff blunt hairs on the scapes (*elidisum*), or minute decumbent pubescence (*dumezi*, *pialtum*), but none of these have tibial pubescence as described above.

The two are quickly separated as in *candidum* the gaster is smooth and shining whilst in *isipingense* it is finely and densely punctulate. Apart from this the hairs on the dorsal alitrunk are longer in *isipingense*, the longest of them at least as long as the maximum eye diameter and often greater, whilst in *candidum* they are markedly shorter.

Tetramorium dumezi sp. n.

Tetramorium simillimum r. *isipingense* var. *dumezi* Forel, 1916: 422. Syntype workers, ZAIRE: St Gabriel (*Kohl*) (MRAC, Tervuren) [examined]. [Name unavailable.]

HOLOTYPE WORKER. TL 2·8, HL 0·62, HW 0·52, CI 84, SL 0·37, SI 71, PW 0·38, AL 0·75.

Mandibles smooth and shining with scattered minute pits. Anterior clypeal margin entire, without trace of a median notch. Clypeus with 3 carinae, the median and a weaker lateral flanking pair; usually all three are easily visible but in some the carinae may be faint. Frontal carinae narrow and fine but sharp and conspicuous, reaching back beyond the level of the eyes to the occiput where they fade out or blend with the remaining sculpture, only rarely approaching the margin. Maximum diameter of eye 0·13, about 0·25 × HW and with 7–8 ommatidia in the longest row. With the head in full-face view the sides roughly parallel, more or less straight. Propodeum armed with a pair of short triangular teeth which are variable in size. In general the teeth are shorter than their basal width or about as long as their basal width, but in some they are reduced to minute denticles and in one instance are longer than their basal width. Metapleural lobes varying from triangular to bluntly plate-like, always broader than the propodeal teeth and generally longer, though in some they are about equal in length. Petiole in profile with the sides converging from base to apex so that the node is broader below than above, the dorsal length of the node less than the height of the tergal portion. Both the antero- and posterodorsal angles of the node are blunt, but the latter is distinctly more broadly rounded than the former. Petiole node in dorsal view subglobular, as broad as or slightly broader than long. Dorsum of head with fine, widely spaced, roughly straight longitudinal rugulae; with only 5–6 such rugulae between the frontal carinae at eye level. Occipital region sometimes with a few anastomoses or cross-meshes posteriorly, sometimes without, but never having a developed reticulum. Ground-sculpture of head very faint and superficial, at strongest only forming a weak surface-pattern between the rugulae. Dorsal alitrunk finely and feebly rugulose. In most the rugulae are longitudinal but in some specimens a few cross-meshes are developed. Generally the rugulae are strongest on the pronotum, weaker on the mesonotum and inconspicuous or absent from the propodeum. Ground-sculpture of dorsal alitrunk finely granular or feebly punctulate, usually more conspicuous than on the head. Dorsal surfaces of petiole and postpetiole smooth or with superficial ground-sculpture, not rugulose. First gastral tergite unsculptured. All dorsal surfaces of head and alitrunk with scattered short straight hairs, those on the alitrunk and first gastral tergite distinctly shorter than the maximum diameter of the eyes. Leading edges of scapes and dorsal (outer) surfaces of hind tibiae only with short decumbent to appressed pubescence. Colour clear pale yellow.

PARATYPE WORKERS. TL 2·7–3·1, HL 0·60–0·70, HW 0·50–0·57, CI 80–84, SL 0·36–0·44, SI 70–77, PW 0·36–0·42, AL 0·72–0·84 (10 measured). As holotype but maximum diameter of eye 0·13–0·15, about 0·25–0·27 × HW.

Holotype worker, **Ghana**: Tafo, 9.ii.1971, litter sample (*B. Bolton*) (BMNH).

Paratypes. 10 workers with same data as holotype (BMNH; MCZ, Cambridge).

Non-paratypic material examined. **Ghana**: Numia (*D. Leston*); Bunso (*D. Leston*); Enchi (*D. Leston*); Aburi (*P. Room*); Tafo (*C. A. Collingwood*); Tafo (*C. Campbell*). **Nigeria**: Ibadan (*B. R. Critchley*). **Zaire**: St Gabriel (*Kohl*).

The closest relative of *dumezi, pialtum,* is separated from it by the presence in the latter of a strong median pronotal costa, absent in *dumezi*. The two together are distinguished from other members of the *dumezi*-complex by their lack of standing hairs or pubescence on the scapes and tibiae. In *elidisum* the scapes have short erect hairs similar to those found on the body whilst the tibiae are without standing pilosity. The two other members of the complex, *isipingense* and *candidum*, both have short erect to suberect pubescence on the scapes and on the tibiae.

Tetramorium elidisum sp. n.

(Fig. 125)

HOLOTYPE WORKER. TL 3·4, HL 0·78, HW 0·66, CI 85, SL 0·50, SI 76, PW 0·54, AL 1·02.

Mandibles smooth and shining with scattered small pits. Anterior clypeal margin entire, without trace of a median notch. Clypeus with a median carina and one or two weak lateral carinae, widely separated from the median. Frontal carinae stronger than any of the cephalic sculpture, reaching back behind the level of the posterior margins of the eyes but becoming finer and weaker on the occiput. Maximum diameter of eye 0·18, about 0·27 × HW. Head in full-face view roughly rectangular, the sides more or less straight and approximately parallel, not evenly shallowly convex. Alitrunk with mesonotum swollen (see discussion below), in dorsal view roughly circular and delimited by finely incised lines in front and behind. In profile the mesonotum saddle-shaped, shallowly convex both anteriorly where it meets the pronotum and posteriorly where it meets the propodeum, but shallowly concave centrally. Propodeum armed with a pair of short triangular teeth which are about as long as their basal width, acute apically. Metapleural lobes triangular, distinctly broader than the propodeal teeth and slightly longer. Petiole in profile with dorsal length less than height of tergal portion of node; in dorsal view the node slightly broader than long. Dorsum of head weakly longitudinally rugulose, without cross-meshes and without an occipital reticulum. Ground-sculpture vestigial, at most a very faint superficial granulation. Pronotal dorsum with sparse weak longitudinal rugulae and a very faintly punctulate ground-sculpture. Mesonotum with ground-sculpture almost effaced and rugulose sculpture absent except for 3–4 extremely feeble vestiges which run transversely on the posterior half. Propodeal dorsum finely and densely punctulate-granular. Petiole and postpetiole dorsally with ground-sculpture almost completely effaced and with a few very fine weak rugulae. First gastral tergite everywhere finely and very densely reticulate-punctulate, stronger basally than apically. All dorsal surfaces of head and body densely clothed with short erect blunt stubbly hairs, the longest of which scarcely exceed the length of the small propodeal teeth. Leading edges of antennal scapes with numerous short stubbly erect hairs as on rest of body, but such hairs absent from the tibiae where only very sparse appressed minute pubescence is present. Colour uniform mid-brown, the appendages lighter.

Holotype worker, **Ghana**: Aburi, 13.vii.1969 (*P. Room*) (BMNH).

Amongst the five known species of the *dumezi*-complex, characterized by their smooth mandibles, entire clypeal margins and short sparse pilosity, *elidisum* is isolated by its possession of short erect hairs on the scapes, lack of pilosity on the legs, and very densely sculptured first gastral tergite. Of its close relatives, *isipingense* and *candidum* both have erect or suberect tibial pubescence and have standing pubescence on the leading edges of the scapes, not strong hairs such as occur on the dorsal alitrunk. *T. dumezi* and *pialtum* both have the gaster unsculptured and also lack strong hairs on the scapes.

The swollen mesonotum mentioned in the description may be normal for the species but may equally well represent a pathological condition. As only one specimen is presently known it is impossible to say which is true, and for this reason the condition of the mesonotum has not been used as a key character. However, if the shape of the mesonotum should turn out to be usual in the species then that one character alone will isolate *elidisum*, as no other *Tetramorium* are known which have it swollen and saddle-shaped.

Tetramorium isipingense Forel **stat. n.**

Tetramorium simillimum st. *isipingense* Forel, 1914: 225. Syntype workers, SOUTH AFRICA: Natal, Isipinga, 19.iii.1914, no. 303 (*W. B. Marley*) (BMNH; NM, Bulawayo) [examined].

WORKER. TL 3·2–3·3, HL 0·72–0·74, HW 0·60–0·62, CI 81–84, SL 0·47–0·50, SI 78–81, PW 0·44–0·48, AL 0·88–0·90 (3 measured).

Mandibles smooth and shining with scattered minute pits. Anterior clypeal margin entire, without trace of a median notch. Median clypeal carina strong posteriorly but tending to fade out on anterior half and usually failing to reach the anterior margin; one or two pairs of weak lateral carinae also present on median portion of clypeus. Frontal carinae narrow and fine but quite sharply defined, extending back almost to occipital margin without interruption. Maximum diameter of eye 0·15–0·16, about 0·25–0·27 × HW and with 8–9 ommatidia in the longest row. Head in full-face view with the sides approximately parallel and more or less straight, not evenly convex. Propodeum armed with a pair of minute tubercles or denticles, the metapleural lobes acutely triangular and very much larger than the tiny propodeal armament. Petiole in profile with the dorsal length less than the height of the tergal portion, the posterodorsal angle much broader and more smoothly rounded than the anterodorsal and the sides slightly convergent from base to apex so that the node is narrower above than below. In dorsal view the petiole node subglobular, slightly broader than long. Dorsum of head finely and weakly longitudinally rugulose, with a few anastomoses on the occiput but without a reticulum. Ground-sculpture very feeble, at most a faint glossy superficial patterning. Dorsal alitrunk with faint but quite dense irregular rugulation and a superficial very feebly shagreened ground-sculpture, glossy. Petiole and postpetiole both more or less smooth in places and with patchy vestiges of very feeble ground-sculpture; the former also with a few faint rugulae. First gastral tergite everywhere finely and densely punctulate, more distinct basally than apically but nearly everywhere with narrow shining areas between each minute puncture. All dorsal surfaces of head and body with fine acute hairs, mostly quite short but the longest of those on the pronotum equal to or greater than the maximum diameter of the eye. Dorsal (outer) surfaces of middle and hind tibiae with short erect or suberect pubescence, and leading edges of scapes with similar pubescence. Colour uniform clear pale yellow.

Of the five species included in the *dumezi*-complex of this group only *isipingense* and *candidum* have standing pubescence on the outer surfaces of the hind tibiae. They are easily separated as the gaster in *candidum* is smooth and unsculptured whilst the gaster in *isipingense* is densely punctulate.

Tetramorium jauresi Forel

Tetramorium jauresi Forel, 1914: 226. Syntype workers, SOUTH AFRICA: Natal, Park Rynie, iv.1914 (*H. W. B. Marley*) (MHN, Geneva; BMNH) [examined].

Tetramorium latens Arnold, 1948: 224, figs 11, 11a. Holotype worker, RHODESIA: Bulawayo, Matjesumhlope, 14.xii.1946 (*G. Arnold*) (NM, Bulawayo) [examined]. **Syn. n.**

WORKER. TL 3·6–4·4, HL 0·86–1·06, HW 0·72–0·88, CI 81–86, SL 0·52–0·66, SI 72–79, PW 0·52–0·62, AL 1·02–1·28 (19 measured).

Mandibles usually delicately longitudinally striate throughout, reduced and inconspicuous in a few individuals but never completely lacking. Anterior clypeal margin with a shallow median impression. Frontal carinae present but feebly developed and fine, usually scarcely distinguishable from the remaining sculpture; generally extending back to level of posterior margins of eyes but sometimes slightly longer or shorter than this. Antennal scrobes vestigial or absent. Maximum diameter of eye 0·19–0·24, about 0·25–0·27 × HW. Head in full-face view with sides more or less straight, slightly impressed at eyes, not evenly shallowly convex from front to back. Propodeum armed with a pair of short triangular teeth which are about as long as their basal width or slightly longer. Metapleural lobes as long as the propodeal teeth or slightly longer than them, but considerably broader. With the petiole in profile the anterior peduncle with a conspicuous dentiform anteroventral process. Petiole node in profile with the height of the tergal portion greater than the dorsal length, and with both antero- and posterodorsal angle rounded and blunt. Petiole node in dorsal view roughly globular, as broad as long or very slightly broader than long, evenly curved and with the surfaces rounding into one-another, not separated by angles or sharp edges. Dorsum of head finely and sometimes quite densely weakly longitudinally rugulose, the individual rugulae poorly defined and low; without an occipital reticulum. Ground-sculpture between the rugulae a quite conspicuous dense punctulation or dense shagreening. Dorsal alitrunk finely reticulate-punctate and without rugulose sculpture; the punctulation usually blanketing, fine and dense, but sometimes with smooth patches on the pronotum or mesonotum and always with the individual punctures larger and more sharply defined on the propodeum than elsewhere. Dorsal surfaces of petiole and postpetiole varying from densely finely punctulate to almost smooth, but never with rugulose sculpture. First gastral tergite finely punctulate or superficially shagreened, at least on the basal half. Dorsal surfaces of head and first gastral tergite with scattered short standing hairs. These may be very sparse on the first gastral tergite but a few always appear to be present. Dorsal surfaces of alitrunk, petiole and postpetiole usually without hairs but sometimes 1–2 pairs may be present on the pronotum and one pair may be developed on each of the pedicel segments. Scapes and tibiae only with minute appressed pubescence. Colour uniform medium to dark brown.

T. jauresi forms a small complex with *qualarum* and *nodiferum* within the group. The closest related species is *qualarum* and differences between it and *jauresi* are tabulated under the former name. *T. nodiferum* is less closely related and is quickly separated by its short frontal carinae, small eyes, presence of transverse rugulose sculpture on the propodeum and presence of numerous hairs on all dorsal surfaces of the head and body.

MATERIAL EXAMINED

Rhodesia: Bulawayo, Waterworks (*G. Arnold*); Bulawayo, Burnside (*G. Arnold*). **South Africa**: Natal, Durban (*H. B. Marley*); Natal, St Lucia Lake (*H. B. Marley*); Natal, Pietermaritzburg, World View (*W. L. & D. E. Brown*).

Tetramorium meressei Forel

(Figs 123, 128)

Tetramorium meressei Forel, 1916: 422. Syntype workers, ZAIRE (*Kohl*) (MHN, Geneva) [examined].

WORKER. TL 3·2–3·5, HL 0·70–0·80, HW 0·56–0·64, CI 79–82, SL 0·46–0·52, SI 77–83, PW 0·44–0·50, AL 0·92–1·00 (7 measured).

Mandibles smooth and shining with scattered small pits. Anterior clypeal margin entire, without trace of a median notch. Clypeus with three carinae, the median and a widely separated flanking pair. Frontal carinae feebly developed, fine and narrow, running back beyond the level of the posterior margins of the eyes but fading out on the occiput and merging with the remaining occipital sculpture. Maximum diameter of eye 0·15–0·17, about 0·25–0·27 × HW and with 9–10 ommatidia in the longest row. Head in full-face view roughly rectangular in shape, the sides more or less parallel, not evenly convex. Propodeum armed with a pair of short, small triangular teeth which are shorter and much narrower than the triangular metapleural lobes. Petiole node in profile high, narrowing from base to apex as the anterior and posterior faces converge dorsally, and with the evenly convex dorsum very short, much shorter than the height of the tergal portion of the node. Both the antero- and posterodorsal angles of the node blunt, the dorsum rounding into the anterior and posterior faces. In dorsal view the petiole node subglobular, rounded and slightly broader than long. Postpetiole in profile with a steep and fairly evenly convex anterior face, a high, narrowly rounded dorsum and an abrupt vertical posterior face. Dorsum of head longitudinally rugulose, the rugulae spaced out and with some cross-meshes and anastomoses occipitally but without a strong reticulum. A fine superficial granular or punctulate ground-sculpture present between the rugulae, not conspicuous. Pronotal dorsum irregularly and quite sharply rugulose, forming a loose reticulum in places, the rugulae here more strongly developed than those on the dorsal head. Mesonotum and propodeum much less strongly sculptured, with superficial rugulae. Petiole, postpetiole and gaster dorsally unsculptured, or the last with the faintest traces of shagreening basally, very inconspicuous. Sides of petiole and postpetiole usually with a few faint rugulae, at least anteriorly. All dorsal surfaces of head and body with an abundance of fine acute elongate curved hairs. Sides of head in full-face view with > 10 projecting hairs breaking the outline behind the eyes. Scapes with dense fine suberect pubescence on the leading edges. Dorsal (outer) surfaces of middle and hind tibiae with erect to suberect elongate fine hairs similar to those on the dorsum of the body. Colour uniform pale yellow.

Together with *psymanum, meressei* forms a close species-pair within the *dumezi*-group characterized by smooth mandibles, entire clypeal margin, very dense long pilosity and a high postpetiole node which has a free vertical posterior face. The two are separated by the presence in *meressei* of propodeal teeth and rounded dorsal angles on the petiole. In *psymanum* the propodeum is angular, without developed teeth, and the dorsal petiolar angles are present. Apart from this *psymanum* is brown and has the dorsal alitrunk evenly sculptured, the rugulae on the propodeum and mesonotum being as dense and almost as strong as those on the pronotum. In contrast *meressei* is yellow and has mesonotal and propodeal sculpture much less dense and less intense than on the pronotum.

MATERIAL EXAMINED

Ghana: Tafo (*B. Bolton*).

Tetramorium nodiferum (Emery)

(Figs 121, 126)

Atopomyrmex nodifer Emery, 1901: 115, fig. (footnote). Syntype workers, female, CAMEROUN (*L. Conradt*) (MCZ, Cambridge) [worker examined].

Atopula nodifera (Emery); Emery, 1912: 104.

Tetramorium nodiferum (Emery); Bolton, 1976: 362 [in text].

WORKER. TL 4·4–4·6, HL 1·08–1·12, HW 0·84–0·88, CI 78–79, SL 0·56–0·60, SI 67–68, PW 0·60–0·64, AL 1·22–1·30 (2 measured).

Mandibles smooth and shining, with scattered small pits. Anterior clypeal margin with a shallow but conspicuous median notch. Frontal carinae very short, ending in front of the level of the anterior margins of the eyes; sometimes extended posteriorly by a rugula but this is not differentiated from other rugulae on the head in any way and there is no discernible carina present. Eyes relatively small for a member of this group, maximum diameter 0·17–0·18, about 0·20–0·21 × HW and with 9–10 ommatidia in the longest row. Antennal scrobes absent but the head showing a very faint and feeble shallow concavity between the dorsal margin of the eye and the dorsum of the head proper. Head in full-face view long and narrow, the scapes short (CI and SI, above). Metanotal groove feebly impressed in profile, the propodeum behind it shallowly convex and armed posteriorly with a pair of short blunt teeth. Metapleural lobes long and broad, plate-like, much more conspicuous than the propodeal teeth. Petiole in profile and dorsal view strongly nodiform as in Fig. 126. Dorsum of head and sides above the eyes with fine but quite sharply defined, low, spaced-out longitudinal rugulae. Spaces between the rugulae with a fine superficial ground-sculpture. Pronotal dorsum smooth or at most with a few very faint rugulae towards the lateral margins. Mesonotum mostly or entirely smooth, usually with a few faint longitudinal rugulae. Propodeal dorsum conspicuously transversely rugulose. Dorsal surfaces of petiole and postpetiole unsculptured or with the faintest vestiges of superficial punctures. Gaster unsculptured or with an exceptionally delicate superficial reticulate pattern basally, so fine that it can scarcely be termed sculpture. All dorsal surfaces of head and body with numerous relatively short curved hairs which are suberect to decumbent and curve across the surface from which they arise; the head and alitrunk dorsally also having some relatively longer, stouter, straighter hairs which are erect or suberect. Scapes and tibiae only with short decumbent to appressed fine pubescence. Colour uniform dark brown to blackish brown, sometimes with a very dull reddish tint.

This distinctive species appears closest related to *jauresi* and *qualarum*. The three together are isolated within the group by their possession of a median clypeal notch or impression, absent elsewhere in the group. *T. nodiferum* is quickly separated from the other two by its lack of frontal carinae and distinct transverse rugular sculpture on the propodeum.

The head of *nodiferum* is long and narrow, with CI 78–79, and the antennal scapes are short, SI 67–68. These two characters, taken together, will serve to isolate *nodiferum* from most other *Tetramorium* of this region. Very few species have CI as low as that just quoted. Amongst those which approach *nodiferum* in CI value are most members of the *bicarinatum*-group as represented in Africa, the species of the *dumezi*-group and some members of the *setigerum*- and *sericeiventre*-groups, but in these the scapes are usually longer than in *nodiferum*.

Primarily because of the elongate head Emery (1912) made *nodiferum* the type-species of his genus *Atopula*, to which a number of other species were added, rather haphazardly, by later authors. The types of the type-species of *Atopula* were shown by Bolton (1976: 362) to belong to *Tetramorium*, and *Atopula* thus fell as a synonym of this genus; the other constituents of *Atopula* were dispersed to separate genera as explained in that paper.

MATERIAL EXAMINED
Ghana: Tafo (*B. Bolton*).

Tetramorium pialtum **sp. n.**

HOLOTYPE WORKER. TL 3·1, HL 0·69, HW 0·58, CI 84, SL 0·43, SI 74, PW 0·42, AL 0·86.

Mandibles smooth and shining with scattered minute pits. Anterior clypeal margin entire, without a median notch. Clypeus with three weak longitudinal carinae, the median and a flanking pair. Frontal carinae fine and narrow, extending back to the occiput and merging there with the sculpture. The left carina continuous but the right broken near its base and with a distinct gap. This implies that variation in carinal development such as is seen in *candidum* may also occur here. Maximum diameter of eye 0·15, about 0·26 × HW and with 8 ommatidia in the longest row. With the head in full-face view the sides approximately parallel and more or less straight. Propodeum armed with a pair of short triangular teeth which are about as long as their basal width and which are shorter and narrower than the triangular metapleural lobes. Petiole node in profile with the posterodorsal angle much broader and more broadly rounded than the anterodorsal. Node in dorsal view subglobular and slightly broader than long. Dorsum of head with fine, more or less straight, widely spaced longitudinal rugulae. Some of these are continuous from clypeus to vertex but some are broken or interrupted; 7 are present between the frontal carinae at the level of the eyes. Occipital region without a rugoreticulum. Ground-sculpture of head a very superficial faint patterning only. Dorsal alitrunk irregularly rugulose, strongest on the pronotum where a loose, broken reticulum is present but much weaker and less conspicuous posteriorly. Midline of pronotum with a strong longitudinal costa, which is distinctly stronger than the rugulae on each side of it. Ground-sculpture of alitrunk dorsum a fine, almost effaced granulation. Petiole and postpetiole almost smooth, with only the faintest vestiges of sculpture. Gaster unsculptured and smooth. All dorsal surfaces of head and body with standing short hairs. Scapes and tibiae only with short decumbent to appressed pubescence. Colour brownish yellow.

Holotype worker, **Ghana**: Tafo, G-block, 11.xi.1968, on bark of tree (*C. A. Collingwood*) (BMNH).

This small species is most closely related to the more common *dumezi* and shares most characters with it. Separation of the two is based on sculpture differences as *dumezi* lacks the pronotal median costa seen in *pialtum* and has only 5 rugulae between the frontal carinae at eye-level as opposed to 7 in *pialtum*. Apart from these the pronotal sculpture is coarser in *pialtum* where a broken reticulum is present, whereas in *dumezi* the sculpture is feeble and predominantly longitudinal, at most with a few cross-meshes.

Tetramorium psymanum sp. n.

HOLOTYPE WORKER. TL 3·1, HL 0·72, HW 0·56, CI 78, SL 0·47, SI 84, PW 0·44, AL 0·88.

Mandibles smooth and shining with scattered minute pits. Anterior clypeal margin entire, without trace of a median notch. Clypeus with a median carina and with 2 flanking pairs, the inner pair of which is slightly stronger. Frontal carinae fine and narrow, reaching back well beyond the level of the posterior margins of the eyes but fading out on the occiput and merging with the sculpture there. Maximum diameter of eye 0·15, about 0·27 × HW and with 8 ommatidia in the longest row. Sides of head in full-face view roughly parallel, not evenly convex. Propodeum armed with a minute tubercle or merely angulate, without strong teeth. Metapleural lobes broadly triangular, much more massive than the propodeal armament. Petiole node in profile high, tapering from base to apex as the anterior and posterior faces converge dorsally, the dorsal length less than the height of the tergal portion of the node. Antero- and posterodorsal angles of the node present but blunted. In dorsal view the petiole node roughly globular, about as broad as long. Postpetiole in profile higher than the petiole; the anterior face a steeply ascending shallow convexity, the dorsum narrowly rounded and the posterior face vertical and abrupt. Dorsum of head finely irregularly longitudinally rugulose with a few cross-meshes and anastomoses occipitally and with a weak superficial granular or punctulate ground-sculpture between the rugulae. Dorsal alitrunk irregularly densely rugulose everywhere, in places forming a loose reticulum or open-meshed net but the sculpture about equally strongly developed everywhere. Dorsal petiole and postpetiole unsculptured but the sides with vestigial traces of sculpture. First gastral tergite unsculptured. All dorsal surfaces of head and body covered by a dense coat of elongate, fine curved acute hairs. Leading edges of antennal scapes with projecting fine pubescence which is predominantly suberect. Dorsal (outer) surfaces of middle and hind tibiae with abundant fine erect long hairs similar to those on the body. Colour uniform mid-brown, the appendages lighter.

Holotype worker, **Ghana**: Bunso, 15.vii.1969, ant ecology sample × 20 (*D. Leston*) (BMNH).

Closely related to *meressei* and sharing the dense pilosity and characteristically shaped postpetiole of that species, *psymanum* and *meressei* form a discrete complex within the *dumezi*-group. Like the members of the larger *dumezi*-complex *meressei* and *psymanum* have smooth mandibles and an entire anterior clypeal margin, but unlike them they have a dense pelt of elongate fine soft hair, and a high postpetiole with an abrupt, vertical posterior face. The principal characters separating *meressei* from *psymanum* are that *meressei* is yellow, has propodeal teeth present, has rounded dorsal petiolar angles, and has the mesonotum and propodeum much less strongly sculptured than the pronotum.

A third species of the *meressei*-complex is represented by a single badly-damaged specimen in BMNH originating from Nkoemvon in Cameroun. It is close to *psymanum* in most respects but the petiole node is lower and has rugular sculpture conspicuous on the sides. The head is less densely but more sharply sculptured and has a loose occipital rugoreticulum; ground-sculpture is virtually absent.

Although this specimen represents a third distinct species in this complex I do not intend to name it here as the postpetiole and gaster are missing and much of the pilosity has been abraded away.

Tetramorium qualarum sp. n.

(Figs 122, 127)

HOLOTYPE WORKER. TL 3·5, HL 0·86, HW 0·72, CI 84, SL 0·62, SI 86, PW 0·52, AL 1·04.

Mandibles smooth and shining with scattered small pits, the surface in places with a few minute scratch-like marks but without longitudinal striae or rugulae. Anterior clypeal margin with a shallow and inconspicuous median impression. Frontal carinae weakly developed, running back beyond level of eyes but only feeble behind the level of the anterior margins of the eyes; posteriorly the carinae failing to reach the occipital margin and for much of their length weaker than the cephalic median carina. Scrobes vestigial, no more than a very shallowly concave area below the frontal carinae. Eyes of moderate size, maximum diameter 0·20, about 0·28 × HW and with 11–12 ommatidia in the longest row. With the head in full-face view the sides more or less straight, slightly concave at eye-level, not evenly shallowly convex. Propodeum armed with a pair of short acute triangular teeth which are about as long and as broad as the similarly shaped metapleural lobes. Petiole in profile high nodiform, the dorsal length of the node less than the height of the tergal portion, and with antero- and posterodorsal angles blunt. Node in dorsal view broader than long, subglobular, all surfaces rounding into adjacent surfaces without angular separation. Dorsum of head feebly and irregularly longitudinally rugulose, the rugulae widely separated and without a reticulum occipitally. Ground-sculpture between the rugulae minimal, consisting only of a delicate faint superficial patterning, the surfaces glossy. Dorsal alitrunk almost entirely smooth, with only the faintest traces of superficial punctulation and completely devoid of rugular sculpture. Petiole, postpetiole and gaster unsculptured. Dorsum of head with a few very short erect hairs but dorsal surfaces of alitrunk, petiole, postpetiole and first gastral tergite without hairs. Second and subsequent gastral tergite fringed by short hairs similar to those on the cephalic dorsum. Scapes and tibiae with sparse minute appressed pubescence only. Colour uniform mid-brown.

PARATYPE WORKERS. TL 3·4–3·7, HL 0·86–0·90, HW 0·72–0·74, CI 82–84, SL 0·60–0·62, SI 83–84, PW 0·52–0·54, AL 1·02–1·08 (2 measured). Maximum diameter of eye 0·19–0·20, about 0·26–0·27 × HW and with 10–12 ommatidia in the longest row. Otherwise as holotype.

Holotype worker, **Ghana**: Tafo, 25.ix.1968, on felled trees (*C. A. Collingwood*) (BMNH).
Paratypes. 2 workers with same data as holotype (BMNH; MCZ, Cambridge).

Three species in the *dumezi*-group have a median notch or impression in the anterior clypeal margin. These are *nodiferum, jauresi* and *qualarum. T. nodiferum* is quickly separated as it has transverse rugulose sculpture on the propodeum, short frontal carinae, relatively small eyes (0·20–0·21 × HW), and numerous standing hairs on the head and body. In both *jauresi* and *qualarum* the alitrunk lacks rugulose sculpture, the frontal carinae are long, the eyes are larger (0·25–0·28 × HW) and standing hairs are sparse or absent on the alitrunk. Differences separating *jauresi* and *qualarum* are tabulated as follows.

jauresi	*qualarum*
Mandibles with delicate longitudinal striation (faint in some).	Mandibles smooth, without longitudinal striation.
First gastral tergite reticulate-punctate or shagreened, at least on basal half.	First gastral tergite unsculptured.
Sparse short hairs present on first gastral tergite.	Hairs absent from first gastral tergite.
Dorsal alitrunk finely reticulate-punctulate.	Dorsal alitrunk almost entirely smooth.
Scapes relatively shorter, SI 72–79.	Scapes relatively longer, SI 83–86.

The *aculeatum*-group

(Figs 129–132)

Mandibles smooth or sculptured, armed with 3 teeth apically, followed by a row of 5–7 denticles. Palp formula usually reduced from the basic tetramoriine count of 4, 3 (either 4, 2 or 3, 2; apparently 4, 3 in *rimytyum*). Anterior clypeal margin usually flattened or weakly impressed medially, less commonly entire or strongly notched. Frontal carinae weakly developed and short, ending at or in front of the level of the posterior margins of the eyes. Antennal scrobes absent. Scapes long, SI > 100. With head in full-face view the eyes prominent and the sides behind the eyes rounding broadly and evenly into the occipital margin; the latter usually convex. Metanotal groove usually impressed in profile but only feebly so in some populations. Propodeum usually armed with a pair of spines, but these may be reduced in some cases. Petiole in profile shaped as in Figs 129–131; in dorsal view the node as broad as or broader than long. All dorsal surfaces of head and body clothed with numerous long fine acute hairs, the scapes and middle and hind tibiae with similar standing hairs or with standing dense pubescence.

This group contains the four recognizable species which formerly constituted the genus *Macromischoides*, now synonymized (p. 196). The obvious artificiality of this genus was pointed out in the first part of this survey (Bolton, 1976: 363) and this argument is now strongly reinforced by the discovery of *rimytyum*, a species intermediate between *aculeatum*/*africanum* of this group and *metactum*/*youngi* of the *setigerum*-group, which shows quite plainly where the origins of the *aculeatum*-group lie.

The four species are closely related arboreal forms which are more or less restricted to forest or woodland zones in Africa, but appear to be absent from the extreme south of the continent. All the species except *aculeatum* itself are restricted to West and Central African forests. *T. rimytyum* and *rotundatum* are uncommon, the former being known only from the type-locality in Ghana and the latter from Gabon and Zaire but only from the queen caste. *T. africanum* is more widespread, being distributed throughout the wet forest belts of West and Central Africa, but nowhere does it appear to be very common. *T. aculeatum* on the other hand is truly a dominant and very successful species and occurs in forested or wooded areas virtually throughout Africa. It has also successfully invaded areas cultivated by man where tree or bush crops are grown, particularly cocoa and coffee plantations, and has thus achieved some economic significance (see discussion of *aculeatum* for references).

Tetramorium aculeatum (Mayr)

(Fig. 130)

Macromischa aculeata Mayr, 1866: 507. Syntype workers, GHANA (NM, Vienna; BMNH) [examined].

Tetramorium aculeatum (Mayr); Emery, 1896: 103.

Macromischa wasmanni Forel, 1901: 300. Syntype workers, ZAIRE: Leopoldville (*Wasmann*) (MHN, Geneva) [examined]. **Syn. n.**

Tetramorium aculeatum subsp. *andricum* Emery, 1908: 187. Syntype workers, females, males, ZAIRE: Stanleyville (*H. Kohl*) (probably in MCSN, Genoa). **Syn. n.**

Tetramorium aculeatum var. *major* Forel, 1915: 344. Syntype workers, ZAIRE: St Gabriel (*H. Kohl*) (MHN, Geneva) [examined]. **Syn. n.**

Tetramorium aculeatum var. *rubroflava* Forel, 1916: 420. Syntype workers, ZAIRE: St Gabriel (*H. Kohl*) (USNM, Washington; MHN, Geneva) [examined]. **Syn. n.**

Tetramorium aculeatum st. *andricum* var. *gladiator* Santschi, 1919*a*: 248. Syntype worker, ZAIRE: Congo da Lemba, i.1913 (*R. Mayné*) (NM, Basle) [examined]. [Name unavailable.]

Macromischoides aculeatus (Mayr); Wheeler, 1920: 53; 1922: 187, 889.

Macromischoides aculeatus var. *melanogyne* Santschi, 1923: 285. Syntype workers, female, CONGO: Brazzaville (*A. Weiss*) (types not in NM Basle; presumed lost). [Junior secondary homonym of *Tetramorium melanogyna* Mann, 1919: 345.] **Syn. n.**

Macromichoides [sic] *aculeatus* var. *pulchellus* Santschi, 1924: 208, fig. 8i. Syntype workers, females, males, ZAIRE: Kasai, Kondué (*E. Luja*) (NM, Basle) [examined]. **Syn. n.**

Macromichoides [sic] *aculeatus* st. *wasmanni* var. *abdominalis* Santschi, 1924: 209, fig. 8b. Syntype workers, ZAIRE: Kasai, Kondué (*E. Luja*) (NM, Basle) [examined]. [Name unavailable.]

Macromichoides [sic] *aculeatus* st. *militaris* Santschi, 1924: 209, fig. 8g. Syntype worker, ZAIRE: Basongo, vii.1921 (*H. Schouteden*) (NM, Basle) [examined]. **Syn. n.**

Macromischoides zumpti Santschi, 1937*b*: 101, fig. 4. Holotype worker, CAMEROUN: Kumba, 12–16.x.1935 (*F. Zumpt*) (NM, Basle) [examined]. **Syn. n.**

Macromischoides viridis Weber, 1943: 367, pl. 15, fig. 9. Syntype workers, females, males, SUDAN: Imatong Mts, 4700 ft [1430 m], 3.viii.1939, no. 1419 (*N. A. Weber*) (MCZ, Cambridge; BMNH) [examined]. **Syn. n.**

Macromischoides aculeatus race *inermis* Bernard, 1952: 249. Syntype workers, GUINEA: G'ba, no. 95 (*Lamotte*) (MNHN, Paris) [examined]. [Junior secondary homonym of *Tetramorium inerme* Mayr, 1877: 17.] **Syn. n.**

WORKER. TL 3·2–5·4, HL 0·74–1·20, HW 0·66–1·08, CI 85–90, SL 0·88–1·34, SI 124–150, PW 0·48–0·80, AL 0·90–1·60 (50 measured).

Mandibles usually superficially shagreened or punctulate but very commonly virtually smooth, only rarely with delicate striate sculpture. Masticatory margin armed with 3 teeth apically, followed by a row of 5–7 denticles, the second denticle in the series usually larger than the first. Anterior clypeal margin most commonly with a median notch or impression, but the shape and size of this varies considerably between different series. In some the clypeal margin is more or less evenly arcuate medially, without an impression, but this grades into forms in which the margin is flattened medially, then slightly excavated, then shallowly impressed, and the sequence continues until forms with a distinct notch are encountered. Median clypeal carina usually absent, the central strip of the clypeus often finely punctate. Fine carinae are common on the lateral portions of the clypeal shield but development of a median carina is rare and is generally encountered only in larger individuals, though this is by no means a rule as many large specimens show no trace of a carina. Frontal carinae weakly or not developed, ending at or in front of the level of the posterior margins of the eyes, sometimes indistinguishable from the other cephalic sculpture and often vestigial. Scapes long ($SI > 100$ and $SL > HL$); when laid back on the head always easily exceeding the occipital corners. Antennal scrobes absent. Eyes strongly prominent on sides of head in full-face view, maximum diameter of eye 0·17–0·28, about 0·26–0·30 × HW. With the head in full-face view the sides behind the eyes rounding broadly and evenly into the occipital margin, without obvious occipital corners. Anterior pronotal corners (shoulders) rounded in dorsal view but the sides of the pronotum each with a dorsolateral tumulus or prominence, which in some populations is very conspicuous. With the alitrunk in profile the metanotal groove is usually impressed and the propodeal dorsum just behind the groove is raised into a low welt, though depth of impression and development of the welt are both variable and one or both may be inconspicuous. Propodeal spines enormously variable in length, thickness and degree of elevation. In general they are long, strong and acute but they may be reduced to vestiges; the extremes are shown in Fig. 130. Metapleural lobes at most a pair of very low inconspicuous triangular plates, usually slightly prominent but sometimes so low as to be invisible in profile. Petiole in profile with a long, narrow anterior peduncle and a narrow node, the length of the peduncle distinctly much greater than the thickness of the node at its mid-height. In dorsal view the node transverse, much broader than long, sometimes transversely narrowly ovate in shape but generally with the anterior face more convex than the posterior. Dorsum of head longitudinally rugose and usually with a reticulum occipitally, but the density and intensity of the rugosity variable. In general larger individuals are more strongly sculptured, the rugae more closely packed and with a tendency to radiate outwards posteriorly. In small workers the rugae tend to be weaker and sparser, often with broad unsculptured spaces between them. In such small forms the occipital reticulum usually vanishes, but some quite strongly sculptured small workers are known as well as a few relatively lightly marked large individuals, but the latter are rare. Dorsal alitrunk rugose, predominantly longitudinally so but sometimes with scattered cross-meshes. Dorsal surface of petiole often with fine longitudinal rugulae, but the sculpture may be partially or entirely effaced, leaving the surface superficially punctulate or even smooth. Postpetiole smooth dorsally or with fine punctulation, quite frequently also with fine longitudinal rugulae which vary considerably in number and strength. First gastral tergite smooth or at most with very fine faint superficial patterning. All dorsal surfaces of head and body densely clothed with fine acute hairs of verying length. Scapes and tibiae with numerous outstanding fine hairs. Colour varying from uniform light brown to uniform black or blackish brown. Quite commonly the gaster is somewhat ligher in shade than the head and alitrunk.

One of the commonest species of *Tetramorium* in wooded or forested zones throughout Africa, *aculeatum* may be locally very common. It nests and forages arboreally and is only very rarely found on the ground. The nest, a mixture of silk, vegetable fragments, fungal hyphae and other debris, is constructed under or between leaves or in the branches of trees, commonly at the junction of two or more stems or twigs. The ants are predaceous and very aggressive, and tend to exclude many other ant species from the trees which they occupy. In their role as predator and dominant species these ants are of importance in cocoa-growing areas in keeping down other insect species or, by their presence, excluding these other species from the trees which they occupy. Because of this economic importance some aspects of the ecology and biology of *aculeatum* have been studied. Most of the presently available information is included in Aryeetey (1971), Room (1971), Leston (1973) and Majer (1976), and in the references included in these publications.

As can be deduced from the description, and from the number of infraspecific and infrasubspecific names which *aculeatum* has acquired, this is a very variable species. The majority of the infraspecific names were based on trivial characters such as minor variations in spine length or colour, but all are connected by numerous intermediates, and I am convinced that all these forms represent a single plastic species.

This is by far the commonest member of the *aculeatum*-group. Factors separating it from *africanum* and *rimytyum* are given under those species, and characters separating *aculeatum* females (queens) from others in the group are tabulated under *rotundatum*.

MATERIAL EXAMINED

Ethiopia: Dilla (*K. M. Guichard*). **Sudan**: Equatoria (*N. A. Weber*); Imatong Mts (*N. A. Weber*). **Uganda**: Ruwenzori, Semliki Forest (*D. S. Fletcher*); Mabira (*H. Hargreaves*); Kampala (*H. Hargreaves*); Kagonja (*H. Hargreaves*); Nagunza (*H. Hargreaves*); Kasokwa (*H. Hargreaves*). **Kenya**: Kwale (*E. S. Ross & R. E. Leech*). **Liberia**: Reputa (*W. M. Mann*). **Ghana**: Tafo (*A. H. Strickland*); Tafo (*B. Bolton*); Mt Atewa (*D. Leston*); Bunso (*D. Leston*); Mampong (*D. Leston*); Mampong (*P. Room*); Adeiso (*D. Leston*); Adeiso (*P. Room*); Kade (*J. Majer*); Yenku (*D. Leston*); Enchi (*D. Leston*); Okumaning (*D. Leston*); Goaso (*D. Leston*); Legon (*D. Leston*); Asamankese (*D. Leston*); Akwadum (*A. H. Strickland*); Nsuta (*F. E. Owusu*). **Nigeria**: Gambari (*B. Bolton*); Gambari (*B. Taylor*); Onipe (*B. Taylor*); Gbodo (*B. Taylor*); Owena (*J. T. Medler*); Ibadan (Univ. College coll.). **Cameroun**: Mt Cameroun, Jonga (*M. Steele*); Mann's Quelle (*M. Steele*); Nkoemvon (*D. Jackson*); Matute (*B. Malkin*). **Gabon**: Makokou (*I. Lieberburg*); Plateau d'Ipassa (*J. A. Barra*); Port Gentil (*E. S. Ross & R. E. Leech*). **Fernando Po** (*G. S. Cotterell*). **Zaire**: Ituri For., Beni-Iruma (*N. A. Weber*); Dembia (*R. L. Steyaert*); Irangi, Luhoho River (*E. S. Ross & R. E. Leech*). **Angola**: Caringa (*A. Cardosa*); Mucoco (*A. Cardosa*); C.A.D.A. (*A. Cardosa*).

Tetramorium africanum (Mayr)

(Figs 131, 132)

Macromischa africana Mayr, 1866: 507. Syntype workers, GHANA (NM, Vienna) [examined].
Tetramorium africanum (Mayr); Emery, 1896: 103.
Rhoptromyrmex tessmanni Forel, 1910*b*: 421. Holotype worker, EQUATORIAL GUINEA ('Spanish Guinea'): Alen (*Tessmann*) (MHN, Geneva) [examined]. [Synonymy by Brown, 1964*b*: 12.]
Macromischoides africanus (Mayr); Wheeler, 1922: 188, 890.
Tetramorium lamottei Bernard, 1952: 247, fig. 13F. Holotype female, GUINEA: Zouépo, 1,050 m (*Lamotte*) (MNHN, Paris) [examined]. **Syn. n.**

WORKER. TL 3·7–4·7, HL 0·82–1·00, HW 0·74–0·94, CI 90–96, SL 0·84–1·02, SI 102–114, PW 0·54–0·66, AL 1·00–1·22 (32 measured).

Mandibles usually smooth with scattered pits but rarely some delicate striation is visible between the pits. Masticatory margin of mandible armed with 3 teeth apically, followed by a series of 5–7 denticles; usually the second denticle about as large as the third apical tooth, the first denticle (between them) being distinctly smaller. Anterior clypeal margin with a broad, very shallow indentation medially or with the margin merely flattened and very little concave; very rarely the indentation or flattening so inconspicuous that the margin appears more or less evenly arcuate and entire. Median clypeal carina present, sometimes running the length of the clypeus but sometimes not quite reaching the anterior and posterior borders. Frontal carinae feebly developed and short, ending at the level of the posterior margins of the eyes or before. Antennal scrobes absent. Scapes long, SI > 100; when the scapes are laid back on the head in full-face view they easily surpass the curve of the occipital corner. Eyes of moderate size, maximum diameter 0·17–0·24, about 0·23–0·26 × HW. With the alitrunk in profile the metanotal groove conspicuously impressed and the propodeal dorsum immediately behind the groove usually raised up in a low, broad and roughly triangular peak or tumulus. Propodeal spines elongate and narrow, acute apically; variable in length, thickness and degree of elevation. Metapleural lobes low and rounded, very inconspicuous, sometimes invisible in profile. Node of petiole in profile stout and substantial, shaped as in Fig. 131. The length of the anterior peduncle of the petiole less than to about equal to the thickness of the node at its mid-height. Node in dorsal view thick and distinctly broader than long. Dorsum of head feebly sculptured, at most with a few weak longitudinal fine rugulae, often more or less unsculptured over some or most of the surface. Dorsal alitrunk finely narrowly rugulose, sometimes quite densely so and commonly with the propodeum more densely and less regularly sculptured than the pronotum. Ground-sculpture on the dorsal alitrunk present but superficial and inconspicuous. Petiole dorsum with fine longitudinal rugular sculpture but this is vestigial or more commonly absent from the postpetiole. First gastral tergite unsculptured. All dorsal surfaces of head and body densely clothed with fine acute hairs. Similar hairs are also numerous and very conspicuous on the scapes and middle and hind tibiae where they are suberect to subdecumbent and freely projecting. Colour uniform light brown to mid-brown, sometimes with the gaster slightly darker in shade than the head and alitrunk.

Like its close relative *aculeatum*, *africanum* is an arboreal species which is widespread in the forests of West and Central Africa. Unlike *aculeatum* it does not appear to have invaded the forests and woodlands of the eastern part of the continent and both species seem to be absent from the southern portion of Africa. Where their ranges coincide *africanum* is always decidedly less common than *aculeatum*.

T. africanum differs from *rimytyum* as the head in the latter is coarsely sculptured, the petiole differently formed (Fig. 131), the metapleural lobes strongly developed and the tibiae only have elevated pubescence, not long hairs. Apart from differences in petiole node construction noted in the key, *africanum* is separated from *aculeatum* as follows.

africanum	*aculeatum*
Sting appendage vestigial, reduced to a narrow strip dorsally.	Sting appendage conspicuous, triangular and freely projecting dorsally.
Palp formula 4, 2.	Palp formula 3, 2.
Scapes shorter, SI 102–114.	Scapes longer, SI 124–150.
Median clypeal carina present.	Median clypeal carina usually absent.
Dorsum of head weakly sculptured.	Dorsum of head strongly sculptured.

MATERIAL EXAMINED

Liberia: no loc. (*O. A. Hardy*). **Ghana**: Tafo (*B. Bolton*). **Nigeria**: Gambari (*B. Taylor*). **Cameroun**: Ntsama (*C. A. Collingwood*); no loc. (*J. Risbec*). **Gabon**: Makokou (*I. Lieberburg*). **Zaire**: Yangambi (*N. L. H. Krauss*); Dembia (*R. L. Steyaert*).

Tetramorium rimytyum **sp. n.**

(Fig. 129)

HOLOTYPE WORKER. TL 4·8, HL 1·04, HW 0·90, CI 87, SL 0·98, SI 109, PW 0·66, AL 1·34.

Mandibles longitudinally striate, armed with three teeth followed by a series of 5 denticles which decrease in size basally. Anterior clypeal margin with a conspicuous median notch, the median portion of the clypeus with 3 strong longitudinal carinae and with 1–2 weaker carinae outside these on each side. Frontal carinae hardly distinguishable from the remaining cephalic sculpture, being only slightly more strongly developed; they can be distinguished to the level of the eyes but behind this are inseparable from the other sculpture. Antennal scrobes absent, the scapes long (SI > 100). Eyes prominent, roughly hemispherical in full-face view, their maximum diameter 0·20, about 0·22 × HW. Number of ommatidia in longest row difficult to count due to curvature of the eye, but approximately 12–13. With the head in full-face view the occipital margin shallowly convex, rounding broadly and evenly into the sides, the curvature including almost all the space between the posterior margins of the eyes and the occipital margin. Metanotal groove in profile broadly but shallowly impressed. Propodeum armed with a pair of long narrow spines which are much longer than the acutely triangular metapleural lobes. Petiole and postpetiole in profile shaped as in Fig. 129; in dorsal view the petiole node as broad as long. Dorsum of head strongly but irregularly longitudinally rugose with a few scattered cross-meshes. Occipitally the rugae even more irregular and with more numerous and stronger cross-meshes which form a loose reticulum in places. Sides of head above and behind eyes with a loose, broad-meshed rugoreticulum. Ground-sculpture minimal, the spaces between rugae generally glossy, at most with very faint superficial markings. Dorsal alitrunk rugose, predominantly longitudinally so on the promesonotum although the rugae are very irregular and are stronger and more widely spaced on the pronotum than on the mesonotum. Rugae on propodeal dorsum weaker and very irregular. Ground-sculpture vestigial or absent. Both petiole and postpetiole with rugose sculpture dorsally, but those on the latter segment much weaker, more widely spaced and more regularly longitudinal than those on the former. First gastral tergite unsculptured. All dorsal surfaces of head and body with abundant long fine acute hairs, the longest of those on the alitrunk easily exceeding the maximum diameter of the eye. Dorsal (outer) surfaces of middle and hind tibiae with fine suberect to subdecumbent dense pubescence. Colour uniform dark brown.

Holotype worker, **Ghana**: Mt Atewa, 1.xii.1968, on fallen tree trunk (*B. Bolton*) (BMNH).

This fascinating primary forest species is an almost exact intermediate between members of the *aculeatum*-group and those of the *setigerum*-group close to *metactum* (compare Figs 57 and 129). The decision to place *rimytyum* in the *aculeatum*-group is based on the presence of a clypeal notch, the reduction of the frontal carinae and the presence of elevated tibial pubescence in this species. These characters are general in the *aculeatum*-group but not in *setigerum* and its allies, but the overall similarity in body form between *metactum* and *rimytyum* is obvious.

Within the *aculeatum*-group *rimytyum* is separated from both *aculeatum* and *africanum* by its conspicuous triangular metapleural lobes and its possession of elevated pubescence on the tibiae as opposed to the long hairs seen in the other two species. Apart from this it is separated from *africanum* by having the head coarsely sculptured, the petiole node as broad as long in dorsal view, the petiole shaped as in Fig. 129, and the clypeus with coarse carinae. In *africanum* the head is very weakly or not sculptured, the petiole node is much broader than long in dorsal view, the petiole is shaped as in Fig. 131, and the clypeal carinae are fine and widely separated. In the case of *aculeatum* the petiole node is much shorter in profile (Fig. 130) with a correspondingly longer peduncle than in *rimytyum*, and again the node in dorsal view is much broader than long.

Tetramorium rotundatum (Santschi) **stat. n.**

Macromichoides [sic] *africanus* var. *rotundatus* Santschi, 1924: 209. Syntype female, ZAIRE: Région des Lacs (*Sagona*) (NM, Basle) [examined].

FEMALE. TL 6·1–7·0, HL 1·18–1·26, HW 1·16–1·30, CI 98–103, SL 1·16–1·30, SI 100–103, PW 1·20–1·34, AL 1·90–2·10 (4 measured).

This species is known only from the female (queen) but definitely represents a separate good species, closely related to *africanum*. The shape and proportions of the petiole in *rotundatum* are the same as in *africanum* (as in Fig. 131) and both species are clothed with dense short pilosity on the head and alitrunk. However, in *africanum* this pilosity is also present on the first gastral tergite whereas it is absent here in *rotundatum* or at most represented only by a narrow band on the extreme apex of the sclerite, the greater part being hairless. Pilosity is distinctly denser on the appendages (at least) in *africanum*, where the short hairs form a dense mat or pelt on the scapes and tibiae. In *rotundatum* the hairs are sparser and quite widely spaced out on the scapes and tibiae, and in general the length of each hair is about equal to the distance between hairs in the same row. Finally the mesopleuron of *africanum* is densely sculptured with fine disorganized rugulae whereas in *rotundatum* the mesopleuron is almost smooth, at most with fine superficial shagreening or punctulation over most or all of its surface.

Females of *africanum* and *rotundatum* together separate from the much more common *aculeatum* as follows.

aculeatum females	*africanum* and *rotundatum* females
Head narrower, CI < 95 (range 83–90).	Head broader, CI > 95 (range 96–103).
Eyes strongly convex, very prominent; diameter of head across eyes 1·20–1·25 × HW.	Eyes less convex, not as prominent; diameter of head across eyes 1·10–1·12 × HW.
Scapes longer, SI > 110.	Scapes shorter, SI < 110.
Sides of pronotum and mesopleuron strongly and quite regularly longitudinally rugose.	Sides of pronotum and mesopleuron unsculptured or with very irregular fine dense rugulation; sometimes with pronotum unsculptured, mesopleuron sculptured.
Hairs on dorsal (outer) surfaces of hind tibiae and on scapes as long as or longer than the maximum width of the appendage on which they arise.	Hairs on dorsal (outer) surfaces of hind tibiae and on scapes shorter (usually obviously shorter) than the maximum width of the appendage on which they arise.
Body hairs elongate, fine, usually flexuous.	Body hairs short, commonly more so less straight or only slightly curved.
Length of petiolar peduncle greater than thickness of node in profile.	Length of petiolar peduncle less than thickness of node in profile.
Palp formula 3, 2.	Palp formula 4, 2 (*africanum*).

As stated above the worker of *rotundatum* remains unknown. However, as workers and females of *africanum* and *aculeatum* each show the same basic characters there is a good chance that the worker of *rotundatum* will resemble that of *africanum* but lack hairs (or have very reduced pilosity) on the first gastral tergite.

MATERIAL EXAMINED

Gabon: Makokou (*I. Lieberburg*).

The *capense*-group

(Figs 133–140)

This is a convenience-group containing a fortuitous assemblage of five species, in which the mandibles are striate and the clypeus is notched, which do not fit in any previously defined group having these two characters together.

The group is divided into two pairs of related species and an isolated single species. One pair contains the species *amatongae* and *lobulicorne* which are linked by their possession of moderately sized eyes (0·20–0·24 × HW), long frontal carinae which reach almost to the occipital margin, moderately long propodeal spines and a petiole shaped as in Figs 137, 140. They bear many features characteristic of the *camerunense*-group but the construction of the petiole node excludes them from that group.

The second pair, *capense* and *dominum*, share the characters of relatively small eyes (0·17–0·19 × HW) and widely separated frontal carinae which fade out behind the level of the eyes. They seem to bear some affinity with the members of the *shilohense*-group though whether this indicates relationship or convergence cannot be decided at present.

Finally *semireticulatum*, a small species rendered baffling by the number of specialized characters which it possesses in combination, cannot be placed in any other group with even moderate certainty.

All members of this assemblage of oddities inhabit the countries of southern Africa (Mozambique, Rhodesia, South Africa) and, apart from *capense*, seem to be uncommon.

Tetramorium amatongae sp. n.

(Figs 133, 137)

Tetramorium setigerum r. *quaerens* var. *amatongae* Arnold, 1926: 264. Syntype workers, MOZAMBIQUE: Amatongas Forest, 13.ii.1917 (*G. Arnold*) (BMNH; NM, Bulawayo; MRAC, Tervuren; MCZ, Cambridge) [examined]. [Name unavailable.]

HOLOTYPE WORKER. TL 3·9, HL 0·92, HW 0·82, CI 89, SL 0·70, SI 85, PW 0·56, AL 1·05.

Mandibles longitudinally striate. Anterior clypeal margin with a median notch or impression. Frontal carinae elongate, surmounted by a low rim or crest, running back almost to the occipital margin but becoming weaker behind the level of the eyes; occipitally no stronger than the remaining sculpture. Antennal scrobes vestigial and poorly defined. Maximum diameter of eye 0·18, about 0·22 × HW and with 9–10 ommatidia in the longest row. Dorsum of alitrunk uninterrupted in profile or at most with a very slight metanotal impression. Propodeal spines elevated, long and narrow, acute apically, usually straight but sometimes very feebly curved. Metapleural lobes triangular and low, much shorter than the propodeal spines. Petiole in profile nodiform, with a long anterior peduncle. Anterior and dorsal surfaces of node meeting in a right-angle or near right-angle but the dorsal and posterior surfaces separated by a short bluntly rounded curve, not by an angle. In dorsal view the petiole node is as long as broad or slightly broader than long. Dorsum of head with sharp, spaced-out longitudinal rugulae, 8–11 present between the frontal carinae at eye level. A few weak anastomoses occur occipitally between the rugulae but no rugoreticulum is developed. Ground-sculpture on head faint, the spaces between the rugulae shining. Dorsal alitrunk predominantly longitudinally sharply rugulose, the rugulae most regular and most widely and evenly spaced on the anterior half of the pronotum. Behind this the rugulae are less regular and a few weak cross-meshes are developed. Ground-sculpture on the alitrunk vestigial. Petiole and postpetiole finely but sharply rugulose dorsally, the latter segment predominantly longitudinally so. First gastral tergite unsculptured except for hair-pits. All dorsal surfaces of head and body with numerous elongate, fine acute hairs, the longest of those on the alitrunk obviously much longer than the maximum diameter of the eye. Middle and hind tibiae with decumbent to appressed short hairs. Colour uniform mid-brown.

PARATYPE WORKERS. TL 3·6–4·1, HL 0·88–0·94, HW 0·76–0·82, CI 86–89, SL 0·64–0·72, SI 83–90, PW 0·52–0·59, AL 0·98–1·08 (12 measured). As holotype but maximum diameter of eye 0·17–0·18, about 0·22–0·24 × HW.

Holotype worker, **Mozambique**: Amatongas Forest, 13.ii.1917 (*G. Arnold*) (BMNH).

Paratypes. 12 workers with same data as holotype (BMNH; NM, Bulawayo; MRAC, Tervuren; MCZ, Cambridge).

When Arnold first described this form he associated it with *setigerum*, which it superficially resembles but to which it is not really related. The presence of an anterior clypeal notch and the short antennal scapes quickly exclude *amatongae* from further consideration with the allies of *setigerum*.

In many respects *amatongae* approaches the *camerunense*-group but the structure of the petiole militates against its inclusion here. It is possible that *amatongae* represents the remnants of a stock basal to the *camerunense*-group as the petiole shape of the latter can be easily derived from the former, but this is only speculation and cannot be proved at present.

The only species truly related to *amatongae* is *lobulicorne*, and the characters which exclude the former from placement in any other group also apply to the latter. The two are separated as follows.

amatongae	*lobulicorne*
Postpetiole dorsum with strong rugulose sculpture.	Postpetiole dorsum reticulate-punctate.
Hairs on dorsal alitrunk and first gastral tergite long and acute, the longest exceeding the maximum diameter of the eye.	Hairs on dorsal alitrunk and first gastral tergite short, stout and blunt, the longest distinctly shorter than the maximum diameter of the eye.
Base of first gastral tergite smooth.	Base of first gastral tergite shagreened or lightly densely punctulate.
Propodeal spines obviously much longer than metapleural lobes (Fig. 137).	Propodeal spines only slightly longer than metapleural lobes (Fig. 140).
Dorsal alitrunk without punctulate ground-sculpture.	Dorsal alitrunk with conspicuous punctulate ground-sculpture.

Tetramorium capense Mayr

(Figs 135, 138)

Tetramorium capense Mayr, 1865: 89. Syntype workers, South Africa: Cape of Good Hope, Cape Colony (BMNH; NM, Vienna) [examined].

Tetramorium braunsi Forel, 1913*b*: 119. Syntype workers, South Africa: Cape Prov., Willowmore (*H. Brauns*) (BMNH; MHN, Geneva) [examined]. [Synonymy by Santschi, 1913*b*: 435.]

Tetramorium popovici Forel, 1914: 230. Syntype workers, South Africa: Cape Prov., Table Mt, 1500 ft [460 m], 28.xii.1913 (*G. Arnold*) (BMNH; MHN, Geneva) [examined]. **Syn. n.**

Worker. TL 3·8–4·3, HL 0·92–1·08, HW 0·82–0·96, CI 88–92, SL 0·66–0·78, SI 78–83, PW 0·56–0·66, AL 1·00–1·20 (25 measured).

Mandibles longitudinally striate. Anterior clypeal margin with a small median notch or impression. Frontal carinae strongly developed at least to level of posterior margins of eyes and usually beyond this, but fading out or ending suddenly in the occipital region well in front of the occipital margin. The frontal carinae are widely separated at eye level and are surmounted by a narrow rim or crest at least to the level of the posterior margins of the eyes. Antennal scrobes shallow and inconspicuous, no more than a faint impression in the side of the head below the frontal carinae. Eyes relatively small, maximum diameter 0·14–0·18, about 0·17–0·19 × HW and with 6–7 ommatidia in the greatest diameter. Propodeal spines elongate-triangular, stout, acute apically. Metapleural lobes variable in shape but usually broadly triangular, always shorter than the propodeal spines but broader basally. Petiole in profile with a thick anterior peduncle. Anterior face of node meeting dorsum in a right-angle which is sometimes produced into a minute peak. Posterodorsal angle of node blunt and narrowly rounded. Petiole node in dorsal view distinctly broader than long and usually with a narrow but quite distinct low rim or crest traversing the anterior face. Dorsum of head finely and densely longitudinally rugulose and with a fine dense conspicuous punctulate or granular ground-sculpture. In the occipital region the rugulae usually become weaker or partially fade out, but in some individuals a few anastomoses are present; there is no rugoreticulum developed. Dorsal alitrunk finely and densely reticulate-punctate, usually without rugulose sculpture but in some a few faint longitudinal rugulae may be developed on the pronotum. Dorsal surfaces of petiole and postpetiole finely or minutely densely punctulate, sometimes the sculpture very fine and superficial; very rarely one or two vestigial rugulae may be present. First gastral tergite smooth to finely punctulate basally, but most commonly lightly shagreened or with a faint surface-reticular pattern. Hairs on dorsal surfaces of head and body sparse (pronotum with 3 pairs at most) quite stout, blunted long hairs, the longest of which exceed the maximum diameter of the eye; hairs on alitrunk and gaster approximately the same length. Dorsal (outer) surfaces of hind tibiae only with minute decumbent to appressed pubescence.

The only known species which is definitely closely related to *capense* is *dominum* which shares most of its basic features but which is easily separated by its characteristic pilosity. In *capense* hairs are sparsely present on the alitrunk and first gastral tergite and are of the same construction and approximately the same density in both places, being elongate, quite stout and blunt apically. In *dominum* on the other hand hairs are dense on the alitrunk and first tergite and are radically different in form in the two places. Those on the alitrunk are erect, very short, thick and blunt whilst those on the first tergite are very fine, elongate and acute apically, being 3–4 times longer than those on the alitrunk.

The affinities of these two related species are obscure. For the most part they resemble the *shilohense*-group and they could be related to those species in the *shilohense*-complex itself, were it not for the fact that those species lack a notched clypeal margin. Also, the eyes in *capense* and *dominum* are just that bit too large to allow them to fit in easily with the small-eyed forms close to *shilohense*.

MATERIAL EXAMINED

South Africa: Cape Prov., Willowmore (*Brauns*); Willowmore (*G. Arnold*); Willowmore (*H. Swale*); Cape Prov., Karreedouw (*E. S. Ross & R. E. Leech*); Cape Town, Table Mt (*B. Malkin*); East London (*G. Arnold*); Cape Prov., Wilderness (*H. Kirby*).

Tetramorium dominum sp. n.

(Figs 136, 139)

HOLOTYPE WORKER. TL 3·9, HL 0·93, HW 0·90, CI 97, SL 0·72, SI 80, PW 0·60, AL 1·02.

Mandibles finely longitudinally striate. Anterior clypeal margin with a conspicuous median notch. Median clypeal carina fine and sharp, flanked by 1–2 weaker carinae on each side. Frontal carinae sinuate, widely separated, running back to a point just behind the level of the posterior margins of the eyes and surmounted to this point by a narrow raised rim or crest. On the occiput the carinae fade out or become indistinguishable from the remaining sculpture. Antennal scrobes represented only by a broad shallow concavity in the sides between the eyes and the frontal carinae on each side. Eyes relatively small, maximum diameter 0·16, about 0·18 × HW and with 8 ommatidia in the longest row. Head in full-face view almost as broad as long (CI, above) with shallowly convex sides which are distinctly convergent anteriorly (Fig. 136). Behind the eyes the sides convex and rounding evenly into the occipital margin. Propodeal spines in profile narrow and acute, longer than the broad rounded metapleural lobes but much narrower than them. Petiole in profile with a thick anterior peduncle, the anterior and dorsal faces of the node meeting in a right-angle, the posterodorsal angle slightly more obtuse. In dorsal view the node about as broad as long, narrowly rounded anteriorly. Dorsum of head densely and quite regularly finely longitudinally rugulose, the rugulae tending to multiply at eye level so that whilst 11 are present between the frontal carinae at the level of the anterior margin of the eye, there are 17 at the level of the posterior margin. Dorsal rugulae diverge to left and right on occiput and arch around the occipital corners. There is no raguloreticulum developed. Sides of head above, behind and below eyes longitudinally rugulose. Ground-sculpture on dorsum a fine superficial punctulation. Dorsal alitrunk more finely rugulose than head; those on pronotum transverse and arched, longitudinal on remainder of alitrunk; everywhere with a fine superficial punctulate ground-sculpture. Petiole and postpetiole dorsally with vestigial rugulae, first gastral tergite unsculptured. Dorsal surfaces of head and alitrunk with abundant very short stout blunt hairs, distinctly shorter than half the maximum diameter of the eye. In striking contrast the first gastral tergite with abundant long fine acutely pointed hairs which are narrower than those on the alitrunk and about 3–4 times longer. Colour yellowish brown, light.

Holotype worker, **South Africa**: Cape Prov., Willowmore, 1.xii.1976, on sandy soil (*C. F. Jacot-Guillarmod*) (BMNH).

The single specimen of this remarkable species was included in a sample of *T. clunum* collected on sandy soil in which the latter was nesting. Its relationship, if any, with *clunum* is not known, but I suspect that it was just a stray which found its way into the sample by dint of being in the wrong place at the right time.

The only known close relative of *dominum* is *capense* and the two are easily separated by the distinctive pilosity of the former, as described above and as discussed under *capense*.

Tetramorium lobulicorne Santschi

(Figs 134, 140)

Tetramorium lobulicorne Santschi, 1916*a*: 504. Syntype workers, RHODESIA: Bulawayo, 1.i.1915 (*G. Arnold*) (BMNH; NM, Basle; MCZ, Cambridge) [examined].

WORKER. TL 3·3–3·6, HL 0·86–0·90, HW 0·72–0·76, CI 83–84, SL 0·60–0·64, SI 81–85, PW 0·48–0·54, AL 0·90–0·98 (10 measured).

Mandibles strongly longitudinally striate. Anterior clypeal margin with a deep conspicuous anterior notch. Frontal carinae long and sinuate, surmounted by a narrow raised rim or flange and running back onto the occipital region but weakening posteriorly and not reaching the margin; instead they curve outwards posteriorly and form part of the posterior border of the scrobes. Antennal scapes of moderate length but noticeably stout. Scrobes developed below the frontal carinae and running back as a broad impression almost to the occipital margin. Maximum diameter of eye 0·15–0·16, about 0·20–0·22 × HW and with 9–10 ommatidia in the longest row. Propodeal spines in profile short and stout, slightly longer but decidedly narrower than the broadly triangular metapleural lobes. Petiole in profile with a thick anterior peduncle, about equal to the thickness of the node itself, as shown in Fig. 140. Petiole in dorsal view much broader than long. Dorsum of head sharply longitudinally rugulose, with about 9–11 rugulae between the frontal carinae at eye level. No rugoreticulum is developed occipitally but the longitudinal rugulae diverge left and right on the occiput and follow the curve of the frontal carinae towards the occipital corners. Ground-sculpture of head a fine superficial punctulation. Dorsal alitrunk finely and quite densely longitudinally rugulose, usually with some transverse components on the extreme anterior pronotum and often the longitudinals on the promesonotum slightly arched away from the midline. Few or no cross-meshes are present but the ground-sculpture is finely reticulate-punctate and distinct. Dorsum of petiole sometimes with a few faint rugulae but the postpetiole densely reticulate-punctulate or granular. Base of first gastral tergite gently shagreened or finely punctulate. All dorsal surfaces of head and body with numerous short stout blunt hairs; the longest of those on the alitrunk and first gastral tergite distinctly shorter than the maximum diameter of the eye. Antennal scapes and middle and hind tibiae with minute appressed pubescence only. Colour uniform glossy mid-brown, the gaster usually darker brown.

T. lobulicorne is related to *amatongae* and, for the same reasons as discussed under the latter, cannot be placed in any other species-group with any degree of certainty. Characters for separating the two species are tabulated under *amatongae*.

Tetramorium semireticulatum Arnold

Tetramorium semireticulatum Arnold, 1917: 319. Syntype workers, male, RHODESIA: Bulawayo, Hillside, 9.v.1915 (*G. Arnold*) (BMNH; NM, Bulawayo) [examined].

Tetramorium semireticulatum var. *politum* Arnold, 1948: 225. Syntype workers, RHODESIA: Matopos, 26.xi.1939 (*G. Arnold*) (NM, Bulawayo; MCZ, Cambridge) [examined]. [Junior homonym of *T. politum* Emery, 1897: 568.] **Syn. n.**

WORKER. TL 2·3–2·9, HL 0·60–0·72, HW 0·52–0·63, CI 86–90, SL 0·44–0·54, SI 85–91, PW 0·38–0·48, AL 0·66–0·82 (12 measured).

Mandibles longitudinally striate. Anterior clypeal margin with a conspicuous median notch or impression. True frontal carinae very short, ending at or in front of the level of the anterior margin of the eye, only rarely extending slightly further back and with considerable variation in a single series. In some specimens the carinae may appear longer but this is an illusion caused by the presence of rugulae on the dorsum and their absence from the sides of the head; these rugulae are not connected to the frontal carinae. Eyes small, maximum diameter 0·09–0·12, about 0·16–0·19 × HW and with 4–6 ommatidia in the longest transverse row. In profile the eye usually with a small prominence or point at the anteroventral corner. Propodeum in profile armed with a pair of short triangular teeth which are at most as long as the metapleural lobes, usually shorter than them. Petiole in profile with the anterodorsal angle almost or quite right-angular, the posterodorsal angle more obtuse or rounded. In dorsal view the node generally slightly broader than long but in some about as broad as long. All dorsal surfaces of head, alitrunk, petiole, postpetiole, and at least the basal third of (but sometimes all of) the first gastral tergite blanketed by a very dense fine conspicuous reticulate-puncturation which dominates any other sculpture which may be present. Dorsum of head with a few fine, feeble longitudinal rugulae and dorsal alitrunk also with some weak rugulae which are usually confined to the pronotum, generally forming a sparse reticulum anteriorly. All dorsal surfaces of head and body with a number of fine acute quite short hairs, but the scapes and tibiae only with minute decumbent to appressed pubescence. Colour yellowish brown to mid-brown, sometimes with a dull reddish tint.

At first glance this obscure little species seems to belong to the *simillimum*-group, but its notched clypeus and fine pilosity exclude it from there. Considering the whole ant, it shows a number of different characters together which individually are well developed in various other groups, but nowhere except here are they all found in combination. It is thus an overabundance of specialized characters rather than a lack of them which makes *semireticulatum* impossible to place at present.

The *quadridentatum*-group

(Figs 141–145)

This is a convenience-group of 6 species assembled to hold those species with sculptured mandibles and an entire clypeal margin (without median notch or impression) which do not fit into any other group.

Other characters which they have in common include frontal carinae which extend back beyond the level of the posterior margins of the eyes, relatively short antennal scapes (SI < 90; range 77–89), a strongly nodiform petiole and a dentiform or pennant-shaped appendage on the apex of the sting.

The species grouped together here for convenience are in general not closely related but the group is in fact based on a core of three definitely allied species, *quadridentatum, unicum* and *viticolum*, which share a distinctive petiole node shape (Figs 142–143), are coarsely sculptured, quite densely hairy and have fairly large eyes (0·23–0·29 × HW). All three of these species seem to be arboreal, based on personal observation in the case of *quadridentatum*; on Wheeler (1922: 192) for *unicum*, which he misidentified as *meressei*; and on Weber (1943: 373) for *viticolum*. The last two named are known only from their type-series, but the first is fairly widely distributed in west and central Africa, nesting in rot-holes in tree trunks and branches.

Peripheral to this complex is *magnificum* which, although lacking the distinctive node shape seen in the above, seems distantly related to them.

The last two species included here, *longoi* and *simulator*, cannot be associated with any other group or with the above except that they have the few characters in common given at the top of this section. *T. longoi* appears to show affinity with the *scabrosum*-group of South East Asia, having bristly pilosity and freely projecting hairs on scapes and tibiae coupled with coarse sculpture and moderately sized eyes. Whether this is true relationship or convergence is not known.

T. simulator is one of the most peculiar members of the genus yet found in the region. It is a large, reddish, virtually unsculptured ant which lacks hairs of any description on the dorsal surfaces of the body. It has relatively short appendages, large eyes, deep antennal scrobes and heavy mandibles, and superficially it bears a close resemblance to members of the genus *Decamorium*. According to Arnold (1917: 298) it preys on termites and, as termites are the main prey of *Decamorium* (Bolton 1976; Longhurst, Johnson & Wood, 1979), the apparent relationship of appearance may be just a reflection of convergent characters acquired by adoption of a similar lifeway.

Tetramorium longoi Forel

Tetramorium longoi Forel, 1915: 344. Syntype workers, South Africa: Cape Prov., George, x.1914, no. 350 (*H. Brauns*) (BMNH; NM, Bulawayo; MHN, Geneva; MRAC, Tervuren) [examined].

Worker. TL 2·6–3·0, HL 0·66–0·74, HW 0·60–0·68, CI 90–93, SL 0·46–0·50, SI 78–81, PW 0·42–0·50, AL 0·72–0·84 (6 measured).

Mandibles longitudinally striate. Anterior clypeal margin entire, without a median notch or impression. Median clypeal carina present and a lateral pair also developed. Frontal carinae irregular and tending to meander, not more strongly developed than the remaining cephalic sculpture, reaching back to occipital region and merging with the rugoreticulum there. Eyes relatively small, maximum diameter 0·12–0·15, about 0·20–0·23 × HW and with 7–9 ommatidia in the longest row. Propodeal spines triangular and acute, longer than the more broadly triangular metapleural lobes. Metanotal groove shallowly impressed in larger workers, not impressed in smaller. Petiole node in profile with the anterodorsal angle more or less right-angular, the posterodorsal somewhat more obtuse but not rounded and the dorsal surface between these angles more or less flat, at most only very shallowly convex. In dorsal view the petiole node is broader than long and has a low but sharp transverse crest running across the anterior face. Dorsum of head irregularly longitudinally rugulose, with sparse cross-meshes which occur as far forward as the level of the anterior margins of the eyes; the occiput with a sharp rugoreticulum. Dorsal alitrunk sharply finely and fairly densely irregularly rugulose, the rugulae of varying length and direction all over the dorsum, forming a reticulum or partial reticulum in places. Ground-sculpture on dorsal alitrunk a weak but fairly conspicuous superficial punctulation. Petiole and postpetiole finely rugulose dorsally, the former often with reticulation, and both segments with fine punctulate ground-sculpture. First gastral tergite unsculptured. All dorsal surfaces of head and body with numerous short erect blunt hairs, most or all of which are shorter than the maximum diameter of the eye. Dorsal (outer) surfaces of hind tibiae with numerous short, blunt standing hairs which are distinctly shorter than the maximum tibial width. Antennal scapes with finer short hairs which are suberect to subdecumbent and are more noticeable on the dorsal surfaces than on the leading edges of the scapes. Colour uniform medium to dark brown.

Without any obvious relatives in the Ethiopian regional fauna, *longoi* shows some affinities with the *scabrosum*-group of the Oriental and Indo-Australian regions (Bolton, 1977: 115), particularly in the form and distribution of pilosity on the appendages. In the region at present under consideration *longoi* cannot be fitted into any other species-group and is included here merely for convenience. Despite its resemblance to the members of the *scabrosum*-group I have refrained from placing it there for the present as I am not convinced that the apparent relationship is real and not just a convergence phenomenon.

***Tetramorium magnificum* sp. n.**

(Fig. 144)

HOLOTYPE WORKER. TL 5·4, HL 1·16, HW 0·98, CI 84, SL 0·82, SI 84, PW 0·79, AL 1·40.

Mandibles with scattered broad shallow pits, the margins of some pits confluent and giving the appearance of low blunt short rugulae; glossy and without longitudinal striate sculpture. Apical border of mandible with 3 teeth followed by a row of 5 denticles. Anterior clypeal margin entire, with a narrow apron and without a median notch or impression. Median clypeal carina absent. Frontal carinae sharp but not more strongly developed than the other cephalic sculpture, extending onto occiput but merging with the rugoreticulum before reaching the margin. Eyes quite large, maximum diameter 0·28, about 0·29 × HW and with 12–13 ommatidia in the longest row. Propodeum armed with a pair of straight narrow spines which, though short in relation to the size of the alitrunk (spine L about 0·20; AL 1·40), are distinctly longer than the low broadly triangular metapleural lobes. Petiole in profile with a short anterior peduncle and an elongate massive node (Fig. 144). The anterior face of the node meets the dorsum roughly in a right-angle. The dorsum behind this anterior angle is long and shallowly convex and curves evenly into the sloping posterior face. In dorsal view the node is longer than broad (only slightly so in some paratypes). Dorsum of head with strong sharp raised narrow longitudinal rugae, the occipital region and sides of the head with a sharp rugoreticulum. Dorsal alitrunk coarsely sharply rugose, the rugae transversely arched on the pronotum, longitudinal elsewhere and with traces of faint reticular cross-meshes, especially on the posterior mesonotum. Dorsal surfaces of petiole and postpetiole coarsely reticulate-rugose. Ground-sculpture everywhere on head and body vestigial and inconspicuous, at most forming a glossy superficial patterning between the coarse rugae. First gastral tergite unsculptured. All dorsal surfaces of head and body with exceptionally long fine acute hairs, the longest of those on the alitrunk approaching or even equalling the length of the middle tibia. Antennal scapes with short subdecumbent to decumbent hairs only but the dorsal (outer) surfaces of the middle and hind tibiae with very long fine projecting hairs which are distinctly very much longer than the maximum tibial width. Colour yellowish brown, the gaster darker brown.

PARATYPE WORKERS. TL 4·8–5·2, HL 1·08–1·14, HW 0·90–0·94, CI 82–84, SL 0·78–0·80, SI 85–86, PW 0·70–0·76, AL 1·30–1·36 (3 measured). Maximum diameter of eye 0·26–0·28, about 0·29–0·30 × HW. As holotype but two more darkly coloured with the head and alitrunk light brown, the gaster darker.

Holotype worker, **Ivory Coast**: Lamto (Toumodi), 4.iii.1968, AA216 (*J. Lévieux*) (BMNH).
Paratypes. 3 workers with same data as holotype (BMNH; MCZ, Cambridge).

A large and very spectacular species made instantly recognizable by its combination of large size, exceptionally long pilosity, lack of a median clypeal carina, entire clypeal margin, long projecting tibial hairs and characteristic petiole node shape. In fact, the species has so many distinctive characters in combination that it is impossible to confuse it with any other African species. As regards the length of the hairs, this is only approached by *flagellatum* of Borneo which also has spectacularly developed pilosity.

Despite all its exclusive features I am convinced that *magnificum* is related (albeit distantly) to the core-species of this group, namely *unicum, quadridentatum* and *viticolum*, as the overall form of the head and alitrunk and the sculpture are basically similar in all these species. Leaving aside the pilosity, which is probably an individual development, the most obvious difference between *magnificum* and the core-species is the radically differently shaped petiole node (compare Figs 142 and 144), and this is sufficient to preclude close affinity.

Tetramorium quadridentatum Stitz

(Fig. 142)

Tetramorium quadridentatum Stitz, 1910: 144. Holotype worker, CAMEROUN: Mundame (*Conradt*) (MNHU, Berlin) [examined].

Tetramorium commodum Santschi, 1924: 215. Syntype workers, ZAIRE: Ituri, La Moto, Madyu (*L. Burgeon*) and syntype female, CONGO: Comba (*A. Weiss*) (MRAC, Tervuren; NM, Basle) [examined]. **Syn. n.**

WORKER. TL 4·1–5·9, HL 0·96–1·24, HW 0·86–1·12. CI 87–93, SL 0·68–0·94, SI 77–85, PW 0·60–0·86, AL 1·20–1·72 (25 measured).

Mandibles finely longitudinally striate, sometimes delicately so. Apical margin of mandible armed with 3 teeth followed by a series of 6–7 minute denticles, not the usual 3 teeth plus 4 denticles. Anterior clypeal margin arcuate and entire, without trace of a median notch or impression. Median clypeal carina running the length of the clypeus and flanked on each side by 1–2 other carinae; sometimes with two flanking carinae on one side of the median and one on the other. Frontal carinae not more strongly developed than other cephalic sculpture, usually running back beyond the level of the eyes but fading out on the occiput or merging with the occipital sculpture before reaching the margin. Frontal carinae sometimes broken or interrupted anteriorly and a number of specimens with one side carina complete, the other broken or deflected. Maximum diameter of eye 0·22–0·26, about 0·23–0·26 × HW. Propodeal spines in profile usually about equal to the length of the elongate-triangular, very strongly developed metapleural lobes, sometimes slightly longer or shorter; the propodeal spines and long metapleural lobes subparallel (Fig. 142). Petiole node in profile with the anterior and dorsal surfaces confluent through a broad smooth curve, the dorsum shallowly convex. Dorsal surface separated from posterior face by a blunt angle, the posterior face vertical or even slightly concave. Dorsum of head sculptured with widely spaced longitudinal rugulae which usually are irregular or meandering but which are commonly quite straight and regular. Cross-meshes are absent between the rugulae but the occiput usually has a ruguloreticulum; only rarely is the reticulum inconspicuous or reduced in extent. Ground-sculpture of head a fine superficial punctulation or granulation. Dorsal surfaces of alitrunk, petiole and postpetiole rugose; on the alitrunk at least the pronotum reticulate-rugose, sometimes the entire dorsum so sculptured. On the petiole and postpetiole the rugae are mostly commonly longitudinal but a few cross-meshes or a partial reticulum may be formed, especially on the petiole. First gastral tergite finely shagreened, at least basally. All dorsal surfaces of head and body with numerous elongate hairs, some or all of them curved so as to follow the line of curvature of the sclerite on which they arise. Hairs on the first gastral tergite subdecumbent to decumbent and, at least on the posterior half of the sclerite, directed towards the midline. Colour very variable but apparently consistent in each nest-sample, varying from yellowish brown to blackish brown, the lighter coloured forms commonly with the gaster darker in shade than the head and alitrunk.

Widely distributed in West and Central Africa, *quadridentatum* is one of the three closely related species constituting the core of the group. It and its relatives *viticolum* and *unicum* are characterized by the shape of the petiole node, which is quite distinctive (Figs 142, 143). *T.*

quadridentatum is separated from *unicum* as the latter lacks propodeal spines, and from *viticolum* as follows.

quadridentatum	*viticolum*
Larger species, HW $>$ 0·80 (range 0·86–1·12) with broader head (CI 87–93) and shorter antennal scapes (SI 77–85).	Smaller species, HW $<$ 0·80 (range 0·70–0·72) with narrower head (CI 81–83) and longer antennal scapes (SI 86–89).
Dorsum of head without rugular cross-meshes at level of eyes.	Dorsum of head with conspicuous rugular cross-meshes at level of eyes.
Postpetiole not reticulate-rugose.	Postpetiole coarsely reticulate-rugose.
First gastral tergite finely superficially shagreened at most.	First gastral tergite blanketed by fine dense reticulate-punctate sculpture.

T. quadridentatum is an arboreal species which nests in rot-holes in the trunks or branches of large trees.

MATERIAL EXAMINED

Ghana: Aburi (*P. Room*); Koforidua (*P. Room*); Enchi (*D. Leston*); Maasi (*D. Leston*); Goaso (*D. Leston*); Mt Atewa (*D. Leston*); Kade (*D. Leston*); Adeiso (*D. Leston*); Bunso (*D. Leston*); Oyoko (*Collingwood*); Mt Atewa (*Collingwood*); Tafo (*D. Louis*); Mt Atewa (*B. Bolton*). **Nigeria**: Gambari (*B. Bolton*); Gambari (*B. Taylor*); Ibadan (*B. Critchley*). **Cameroun**: Nkoemvon (*D. Jackson*). **Zaire**: Epulu (*J. C. Bradley*).

Tetramorium simulator Arnold

(Figs 141, 145)

Tetramorium simulator Arnold, 1917: 297, pl. 7, fig. 102. Syntype workers, RHODESIA: Malindi, 1.xii.1914 (*G. Arnold*) (BMNH; NM, Bulawayo; MRAC, Tervuren; MCZ, Cambridge) [examined].

WORKER. TL 4·7–5·1, HL 0·94–1·00, HW 0·78–0·86, CI 83–88, SL 0·66–0·74, SI 81–87, PW 0·64–0·72, AL 1·40–1·52 (14 measured).

Mandibles finely, sometimes delicately, longitudinally striate. Anterior clypeal margin entire, without trace of a median notch or impression. Clypeus with a strong median carina running its length, flanked by 2 or more pairs of less strongly developed carinae. Frontal carinae very strongly developed to level of posterior margins of eyes or just beyond, but on the occiput they rapidly fade out or become indistinguishable from the remaining sculpture. From the frontal lobes to approximately the level of the posterior eye margins the frontal carinae have a laterally directed narrow rim or flange which overhangs the scrobes. This rim is strongest anteriorly and narrows posteriorly. Antennal scrobes narrow but deep and conspicuous, forming a strong impression in the sides of the head below the frontal carinae which runs back beyond the level of the eyes. Eyes large, maximum diameter 0·27–0·30, about 0·33–0·36 × HW and with 13–15 ommatidia in the longest row. Propodeal spines in profile short and broad, triangular in shape, but longer than the rounded plate-like metapleural lobes. Node of petiole in profile as in Fig. 141, with the anterior and dorsal faces meeting in a blunt right-angle, the dorsal and posterior faces meeting through a more rounded curve. In dorsal view the node longer than broad. Dorsum of head finely and quite densely longitudinally rugulose, with about 13–15 main rugulae between the frontal carinae at eye level. Occipital region without a rugoreticulum, the longitudinal rugulae continuing to the occipital margin and commonly becoming weaker as they approach it. Ground-sculpture between the rugulae very faint and superficial. Dorsal alitrunk virtually unsculptured, with only faint vestiges of fine longitudinal rugulae, which in some individuals may be fairly numerous. Ground-sculpture vestigial or absent. Petiole and postpetiole dorsally almost unsculptured, often only with very faint fine punctulation but the petiole commonly with some very faint transverse striolae. First gastral tergite unsculptured except for small pits or with an exceedingly fine surface patterning between the pits. Dorsal surfaces of head, alitrunk, petiole, postpetiole and gaster all without hairs of any description; the first gastral tergite with sparse short appressed pubescence. Colour dull red or reddish brown, the gaster darker than the head and alitrunk.

A very distinctive species without close relatives and with a striking superficial similarity to members of the genus *Decamorium*, as discussed in the introduction to this group.

MATERIAL EXAMINED

Rhodesia: Lonely Mines (*H. Swale*); Victoria Falls (*G. Arnold*); Sawmills (*G. Arnold*).

Tetramorium unicum sp. n.

HOLOTYPE WORKER. TL 3·7, HL 0·84, HW 0·70, CI 83, SL 0·60, SI 86, PW 0·54, AL 1·02.

Mandibles delicately longitudinally striate. Anterior clypeal margin entire, without a median notch. Median clypeal carina strongly developed and sharp, forming a narrow raised crest anteriorly and flanked on each side by another raised carina. Frontal carinae feeble and irregular, not more strongly developed than the remaining cephalic sculpture and merging into it just behind the level of the posterior margins of the eyes. Eyes quite large and prominent, situated in a shallowly concave circumocular area. Maximum diameter of eyes 0·20, about 0·29 × HW and with 11–12 ommatidia in the longest row. Propodeum in profile with a pair of minute denticles which, though broad-based, are very short, much shorter than the upcurved triangular metapleural lobes. Petiole in profile with the anterior and dorsal faces united in a single evenly convex curve, the dorsal surface weakly convex and sloping upwards posteriorly. Posterodorsal angle of node roughly right-angular or slightly more obtuse. Postpetiole in profile also with anterior and dorsal faces united in a single even convexity, the dorsum posteriorly with a bluntly prominent angle which overhangs a short but distinctly concave free posterior face. Node of petiole in dorsal view about as long as broad. Dorsum of head with irreguar low rounded longitudinal rugae which meander or are sinuate. A few inconspicuous cross-meshes are present on the dorsum and these are more numerous on the occiput, but a distinct occipital rugoreticulum is not developed. Ground-sculpture of head a fine superficial granulation. Dorsal alitrunk finely and very irregularly rugose, the rugae low and rounded and nowhere forming a sharp reticulum although numerous transverse or oblique short rugulae are present. Petiole and postpetiole with more sharply developed rugae than the alitrunk, mostly longitudinal but with a few meshes, and also with a fairly conspicuous dense punctulate ground-sculpture, especially on the latter segment. First gastral tergite very finely and densely punctulate everywhere, more sharply developed basally than apically. In the central portion of the tergite the punctulae are seen to be separated by small shiny interspaces, and are not confluent or reticulate-punctulate as is the case on the basal portion of the sclerite. All dorsal surfaces of the head and body with numerous quite stout hairs. Colour uniform yellowish brown.

Holotype worker, **Zaire** ('Congo' on data label): Masaki near Masisi, 1°S; 28° 30′E, *Cuviera* (*angolensis*?), no. 158 (no collector's name but probably *J. Bequaert*) (MCZ, Cambridge).

I suspect that this specimen is the one identified by Wheeler (1922: 192) as *meressei*, as the information given there certainly fits, in which case the collector is J. Bequaert as stated in the text. The species is of course not closely related to *meressei* at all but forms a triad of species with *quadridentatum* and *viticolum* which serves as the core of this group.

It is quickly separated from both of these relatives by its lack of propodeal spines, having only a pair of minute denticles.

Tetramorium viticolum Weber

(Fig. 143)

Tetramorium viticola Weber, 1943: 372, pl. 16, fig. 31. Syntype workers, SUDAN: Imatong Mts, W. slopes, 4900 ft [1490 m], 3.viii.1939, no. 1409 (*N. A. Weber*) (BMNH; MCZ, Cambridge) [examined].

WORKER. TL 3·7–3·9, HL 0·84–0·88, HW 0·70–0·72, CI 81–83, SL 0·60–0·62, SI 86–89, PW 0·56–0·58, AL 1·04–1·08 (4 measured).

Mandibles striate. Anterior clypeal margin entire, without a median notch or impression. Median clypeal carina strongly developed and forming a raised crest, especially on the anterior half; the median carina is flanked by at least one other sharp carina on each side, sometimes with two. Frontal carinae scarcely or not more strongly developed than the remaining cephalic sculpture, running back beyond the level of the eyes but irregular throughout their length and not following a more or less straight line. Behind the level of the eyes the frontal carinae quickly merge into the coarse sculpture. Eyes conspicuous, semicircular and domelike in full-face view, maximum diameter 0·19–0·20, about 0·27–0·29 × HW and with 10–12 ommatidia in the longest row. In full-face view the circumocular area of the head is seen to be somewhat concave. Propodeal spines in profile short stout and slightly upcurved along their length. Metapleural lobes as long as, or only slightly shorter than, the propodeal spines; acutely triangular, also upcurved and running roughly parallel with the propodeal spines. Petiole in profile with the anterior and dorsal faces combined in a single evenly convex curve, the dorsum shallowly convex and sloping upwards posteriorly to the sharp posterodorsal angle. Postpetiole also with combined anterior and dorsal faces (Fig. 143) and with a short free posterior face which may be overhung by the projecting posterodorsal angle. In dorsal view the petiole node as broad as long or slightly broader than long. Dorsum of head coarsely irregularly rugose, the rugae mainly longitudinal but meandering and with scattered cross-meshes which occur as far forward as the level of the anterior eye margins. Occipital region with a coarse rugoreticulum and reticulate-rugose sculpture also present on sides of head behind eyes and on sides between eyes and frontal carinae. Dorsal alitrunk coarsely and sharply rugose, forming a loose reticulum which is best developed on the pronotum. Ground-sculpture of head a fine but fairly conspicuous superficial punctulation or shagreening, but this is much weaker or is suppressed on the alitrunk. Petiole and postpetiole sharply reticulate-rugose on all surfaces. First gastral tergite covered in minute dense punctulation which is very conspicuous; similar sculpture is also distinct on the first sternite. All dorsal surfaces of head and body with abundant pilosity. Colour uniform dark yellow or brownish yellow.

This distinctive species is closely related to *quadridentatum* and *unicum*, sharing their characteristic petiole node shape (Figs 142, 143). It is separated from *unicum* by the fact that propodeal spines are reduced to minute teeth in that species. Characters separating *viticolum* from *quadridentatum* are tabulated under the latter name.

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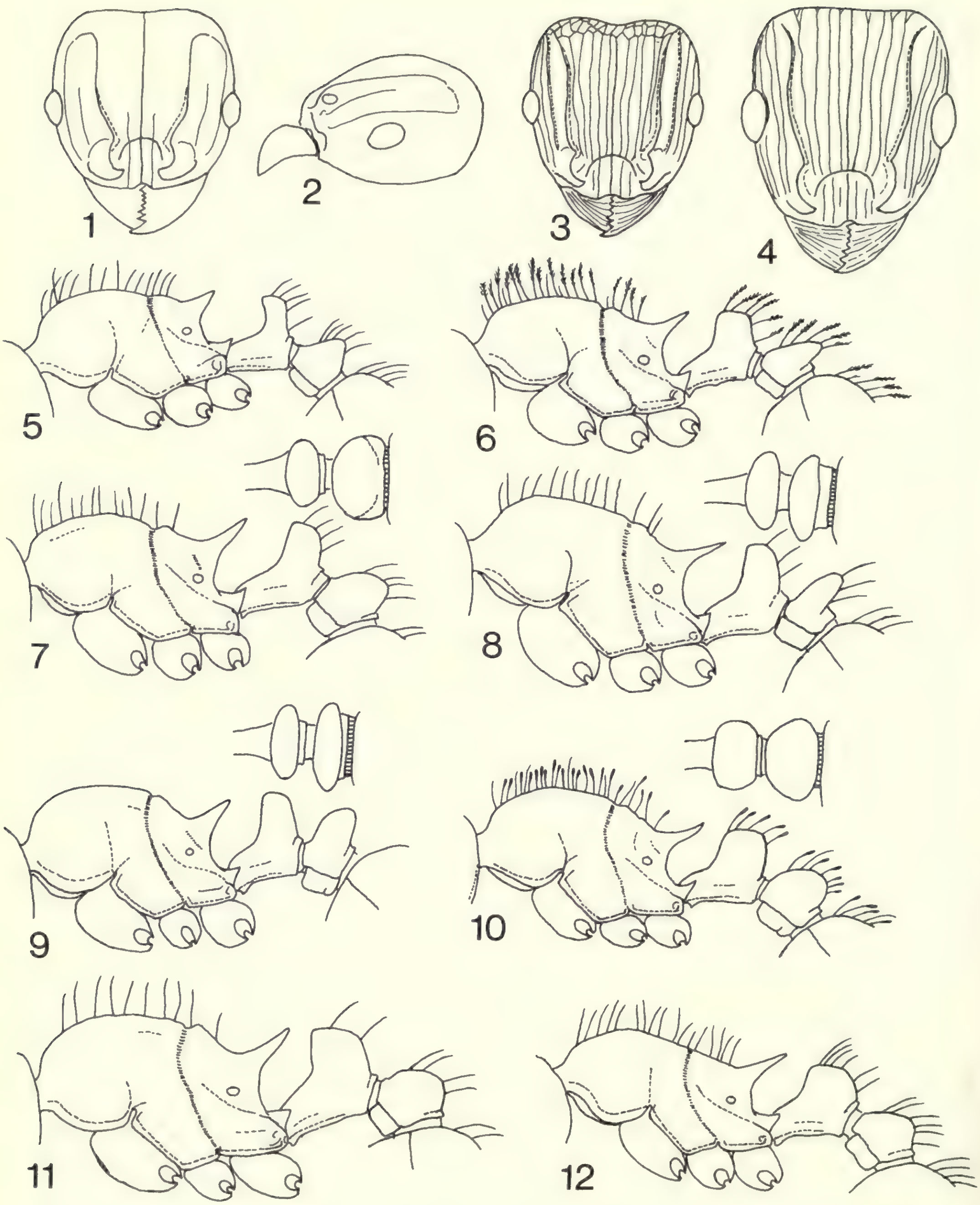

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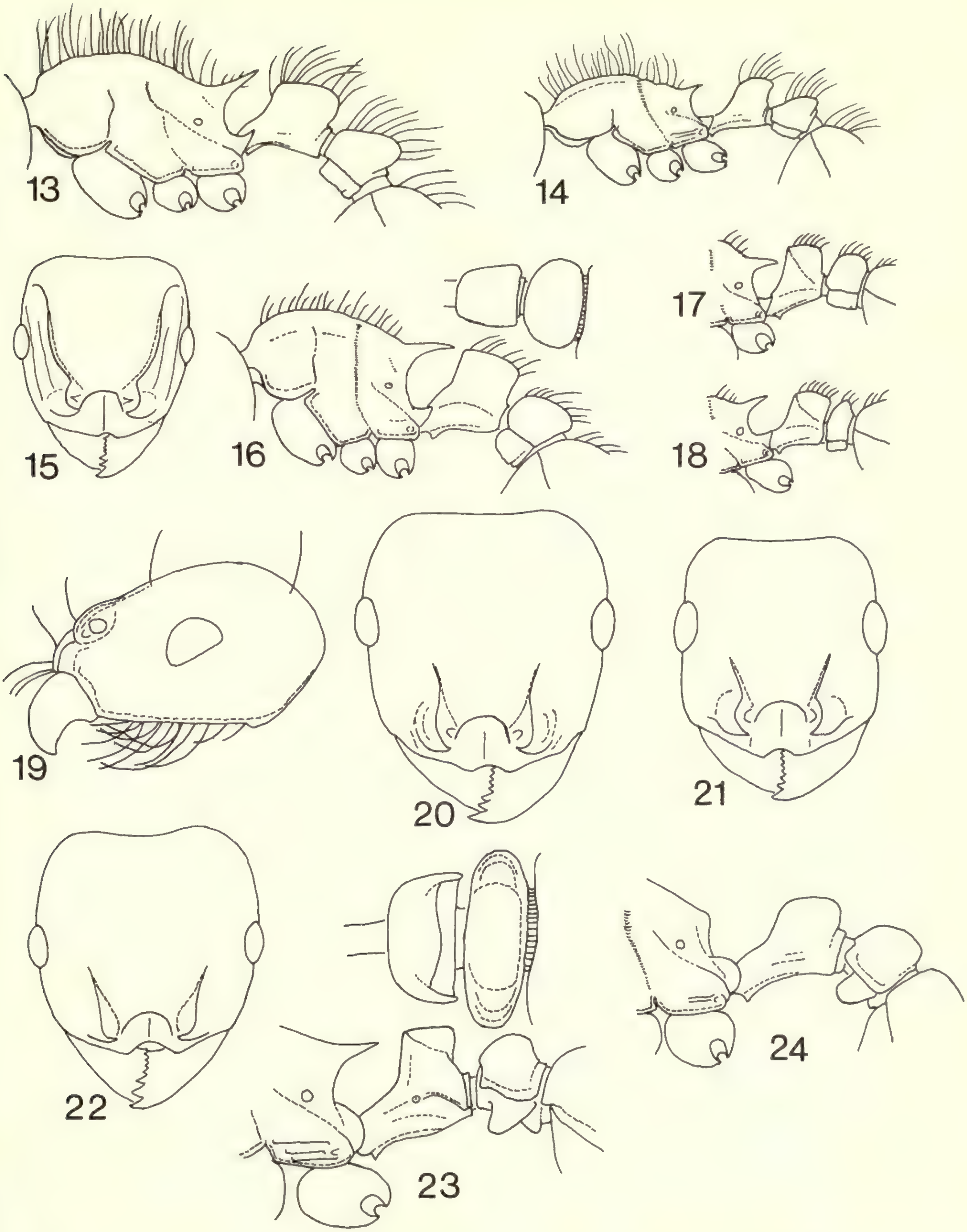

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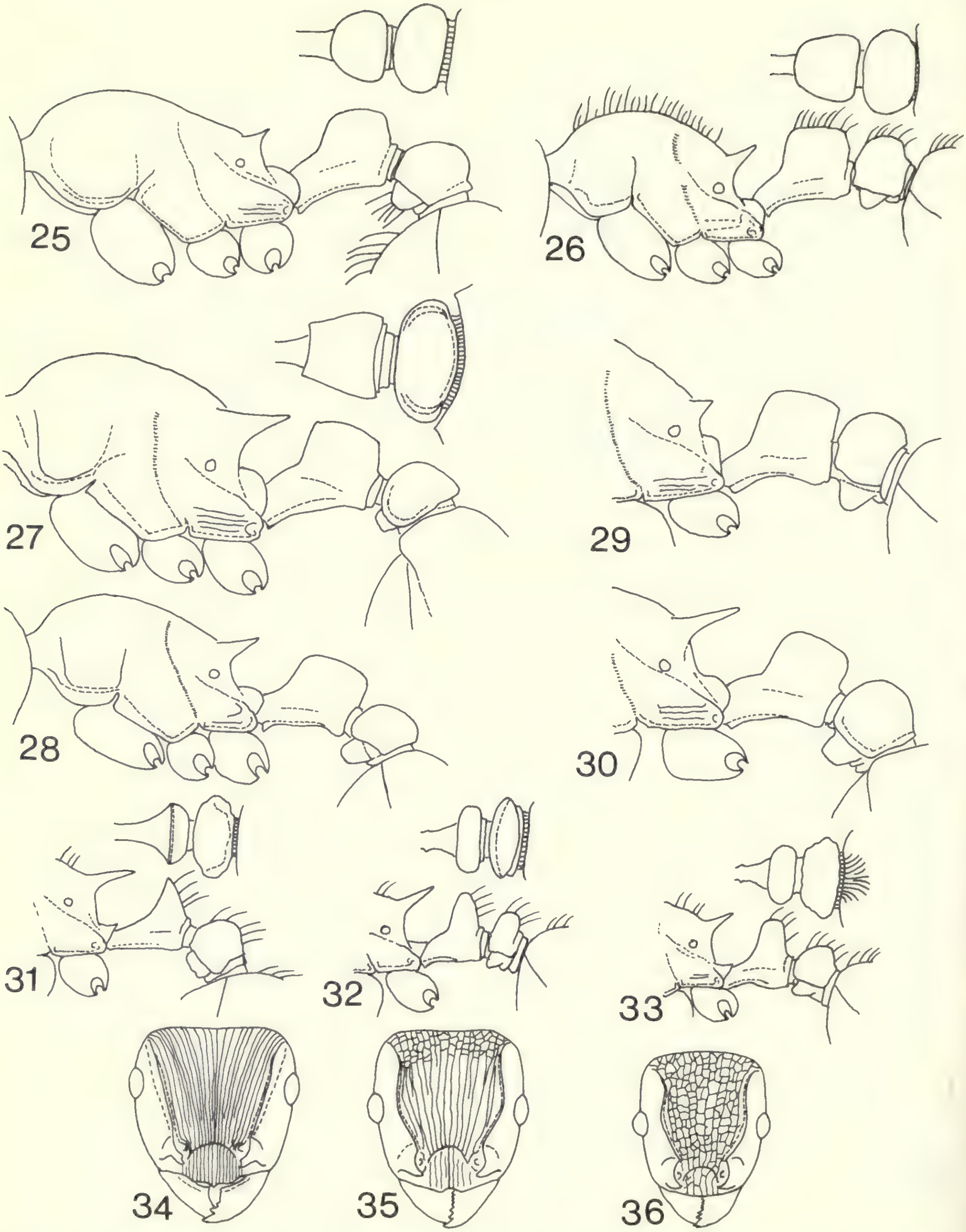

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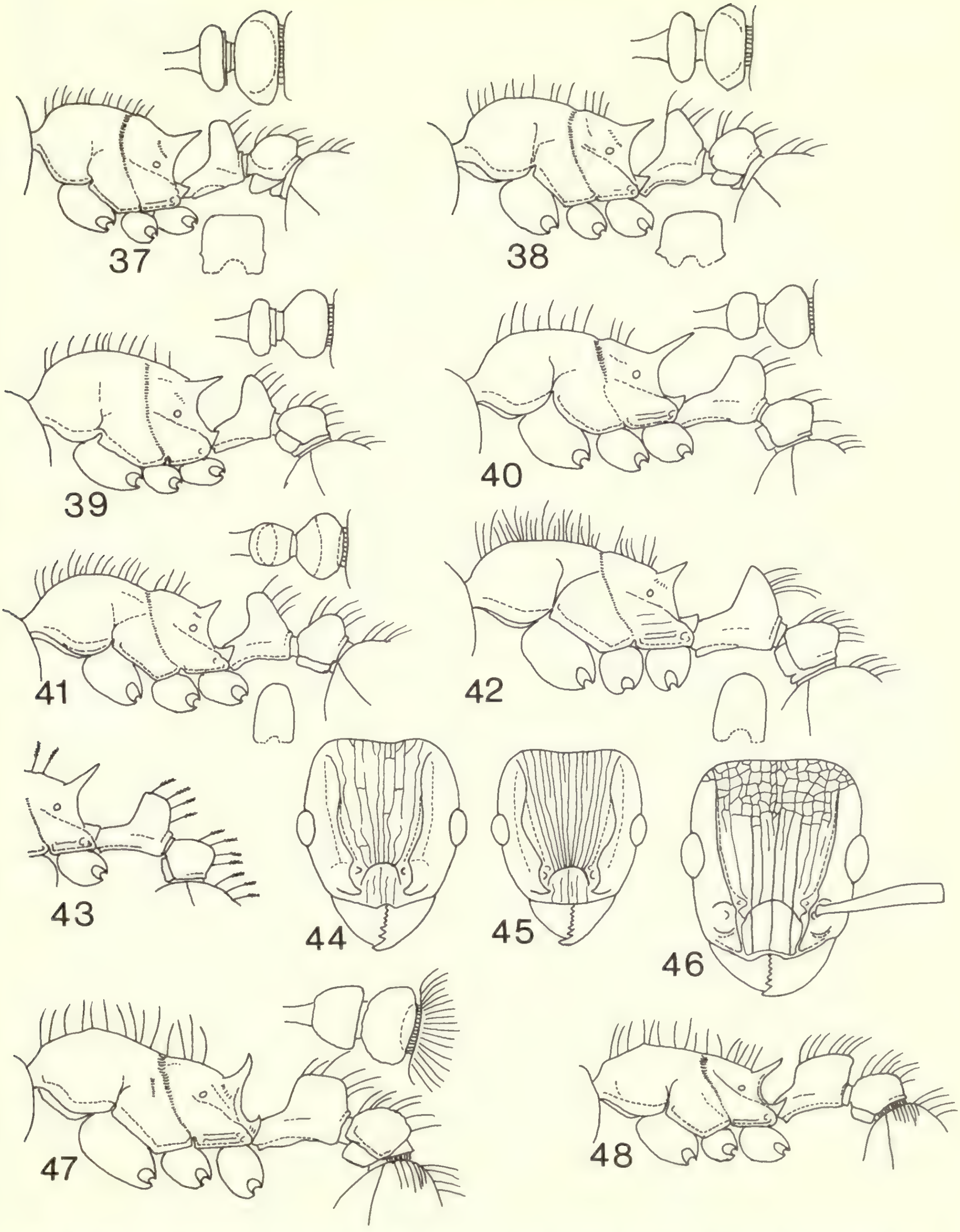

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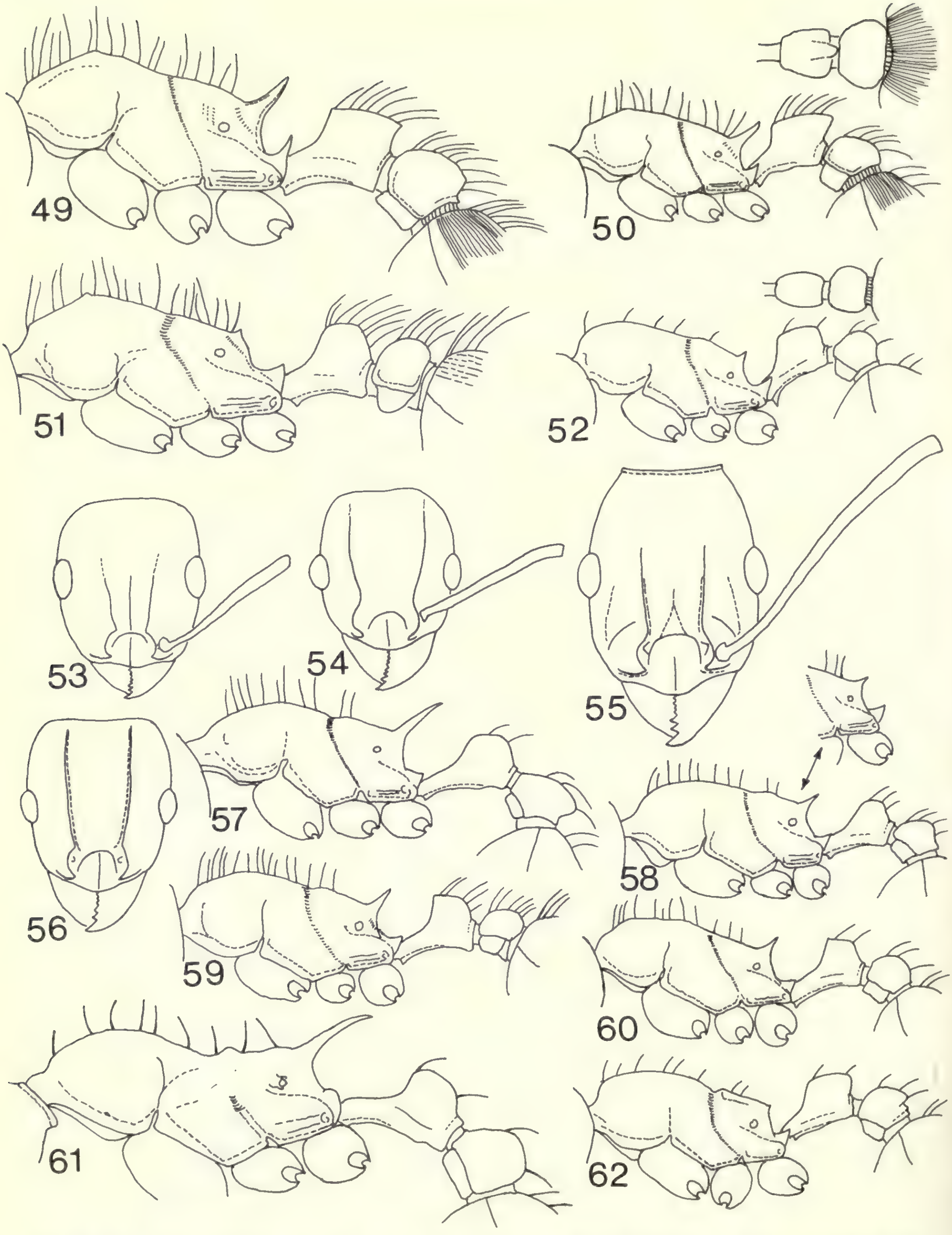

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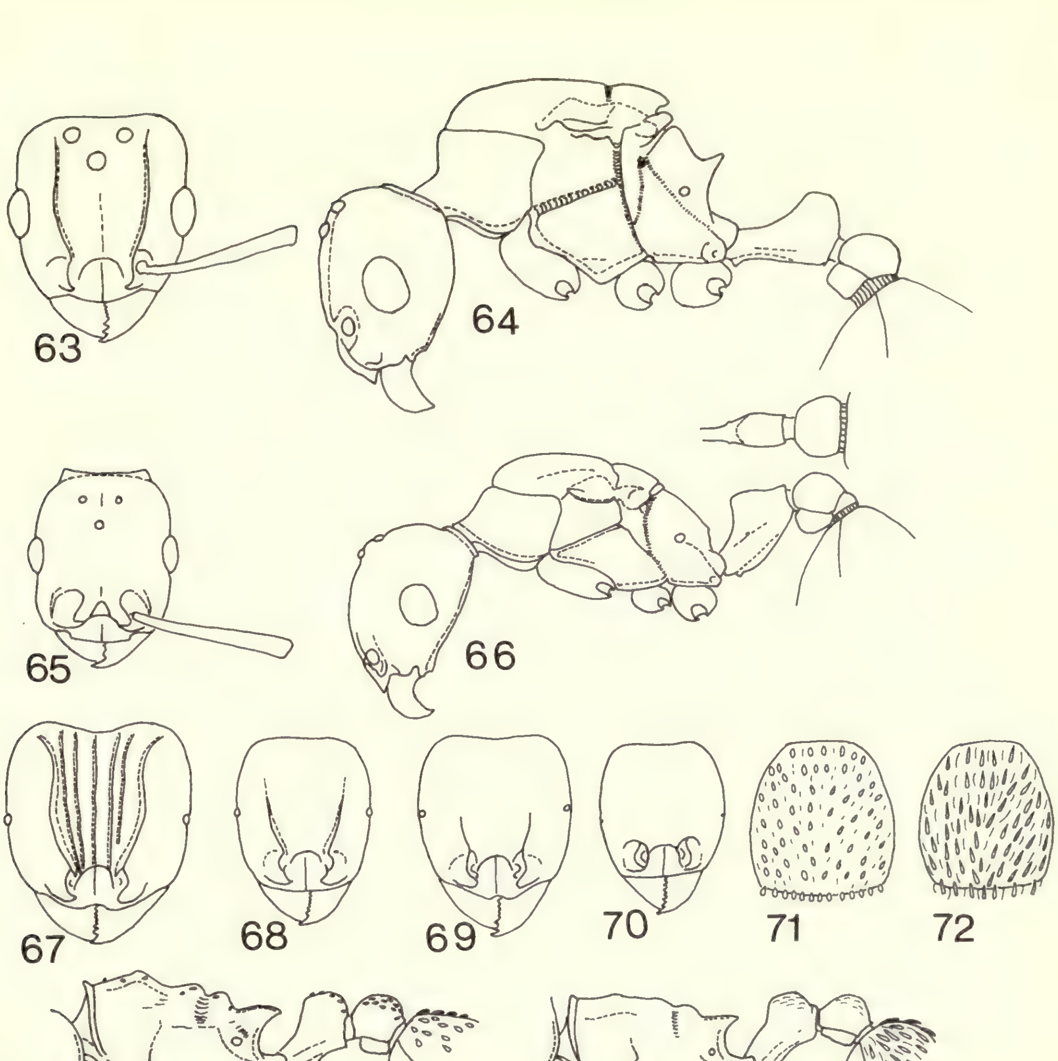

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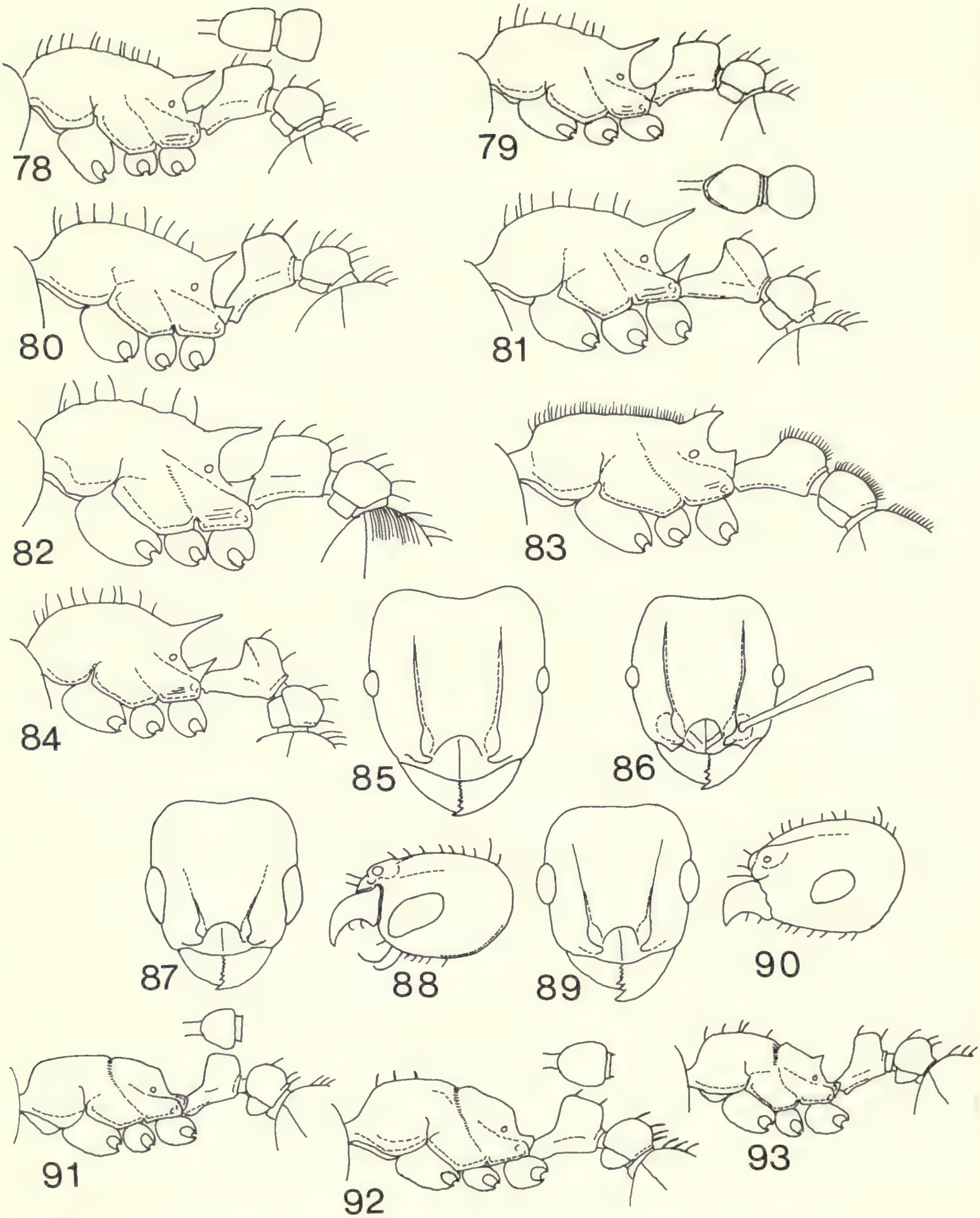
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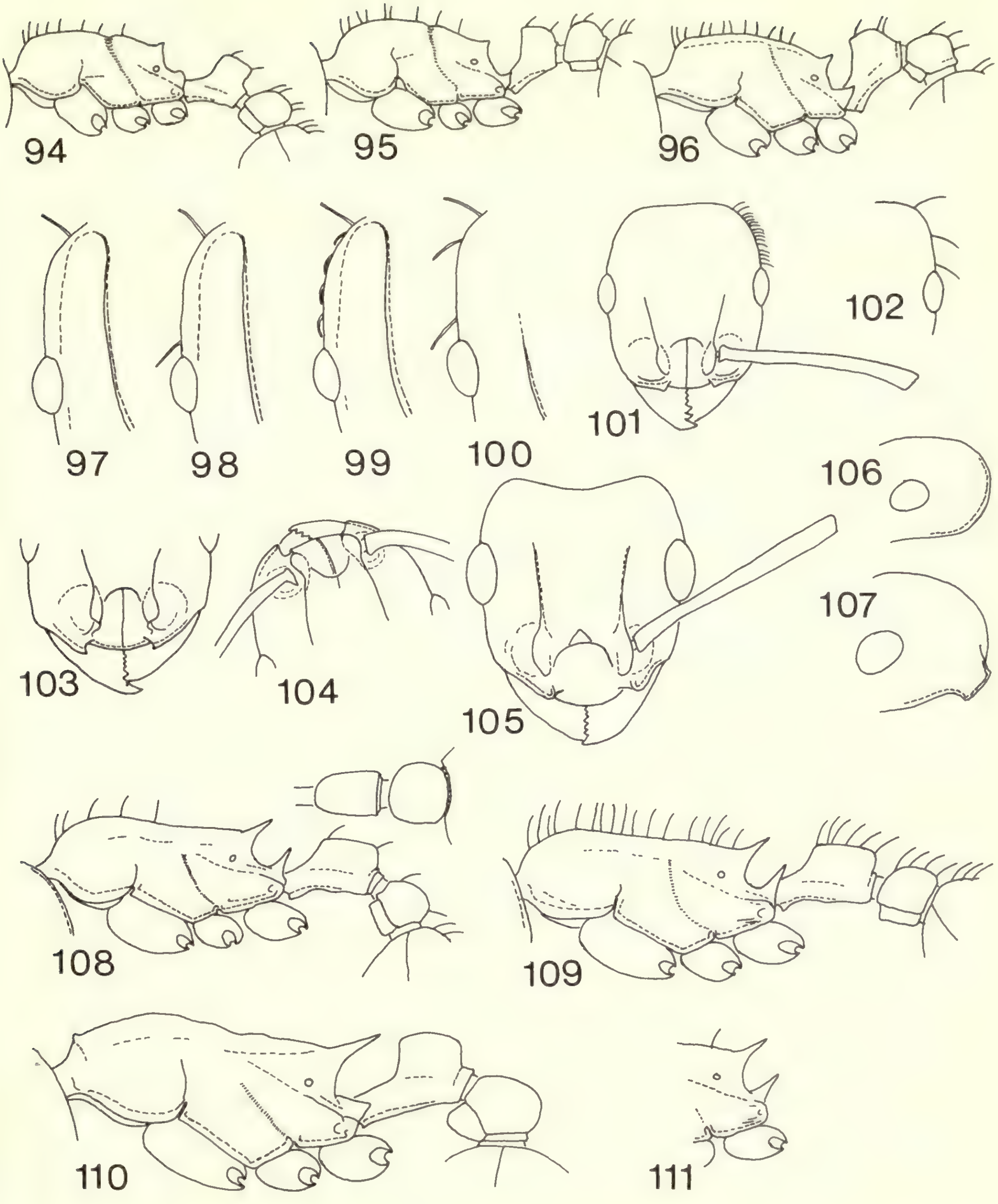

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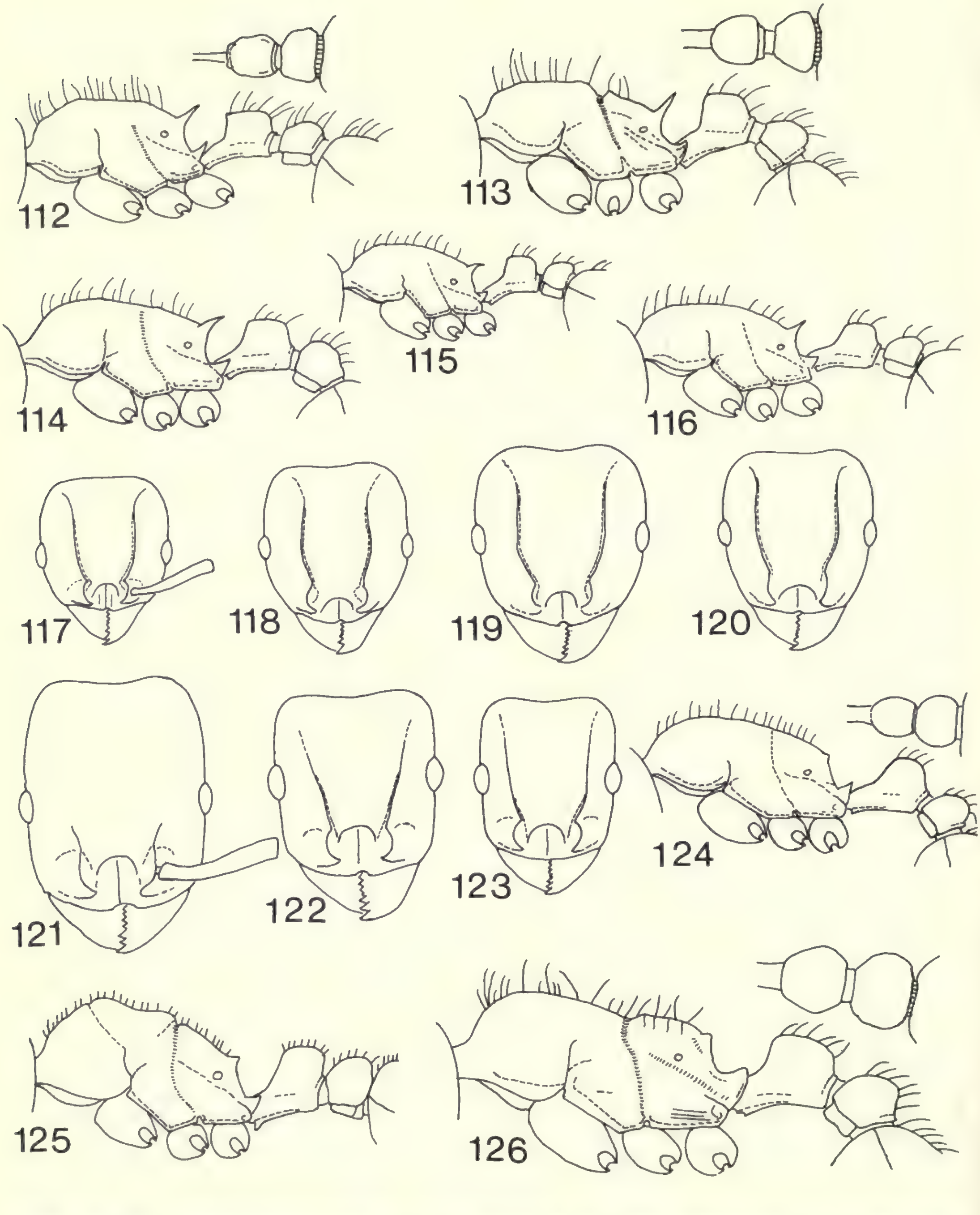
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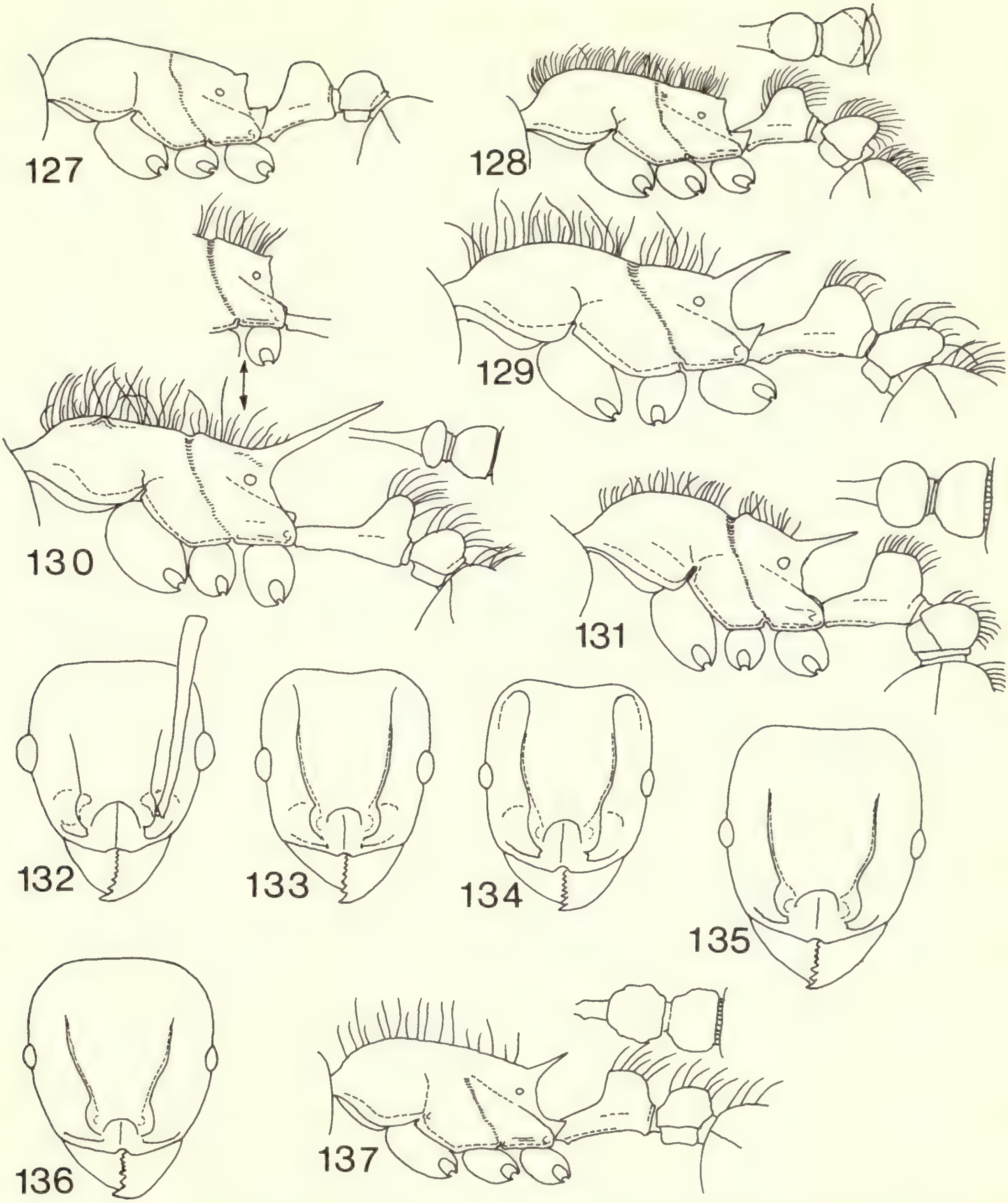

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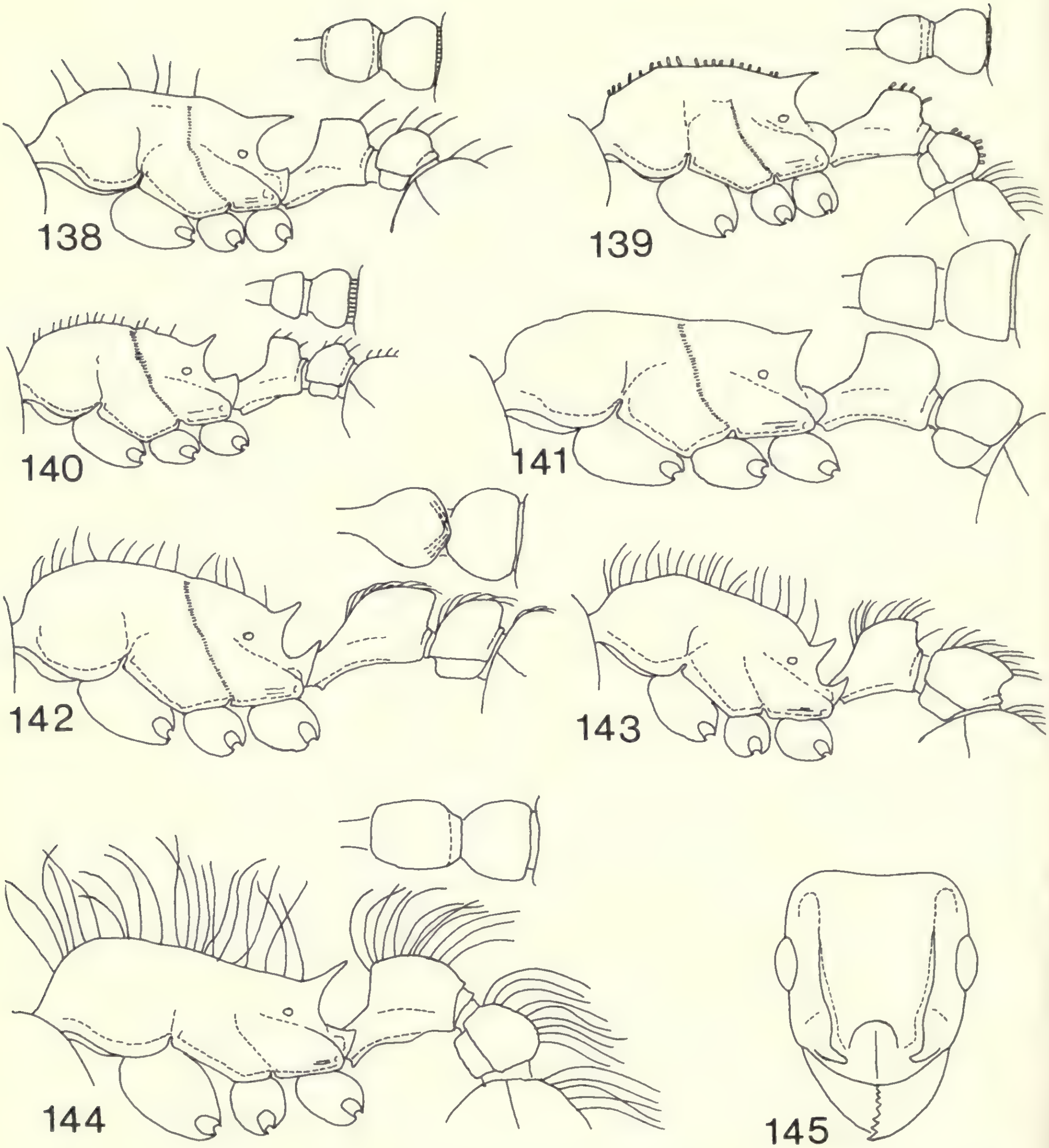
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British Museum (Natural History)

The social wasps of the Americas

O. W. Richards

Social wasps are particularly numerous in South America, both in genera and species. Their nest-building habits are of great interest because of the great variety of architecture, sometimes even in closely allied species. This volume deals with the American social wasps except the Vespinae (those resembling the British wasps) which are northern in distribution and only just extend to Mexico. The nests, habits and larvae of the wasps are described as far as they are known. The main purpose of the work, however, is to make it possible to identify the 500 species of wasps. There is no recent work for this purpose and there has never been a really comprehensive one. In preparing this volume a great many of the types of earlier authors have been examined, including those of Zikán which have hitherto been difficult to trace.

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